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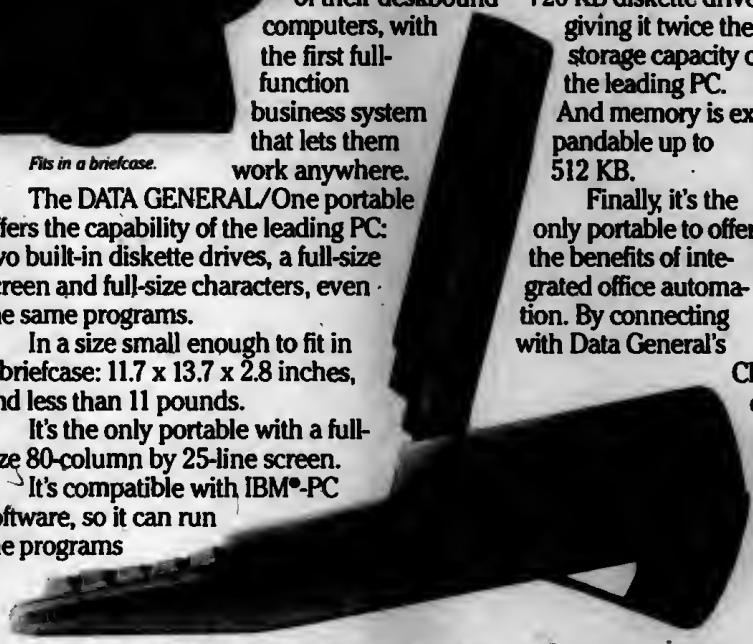

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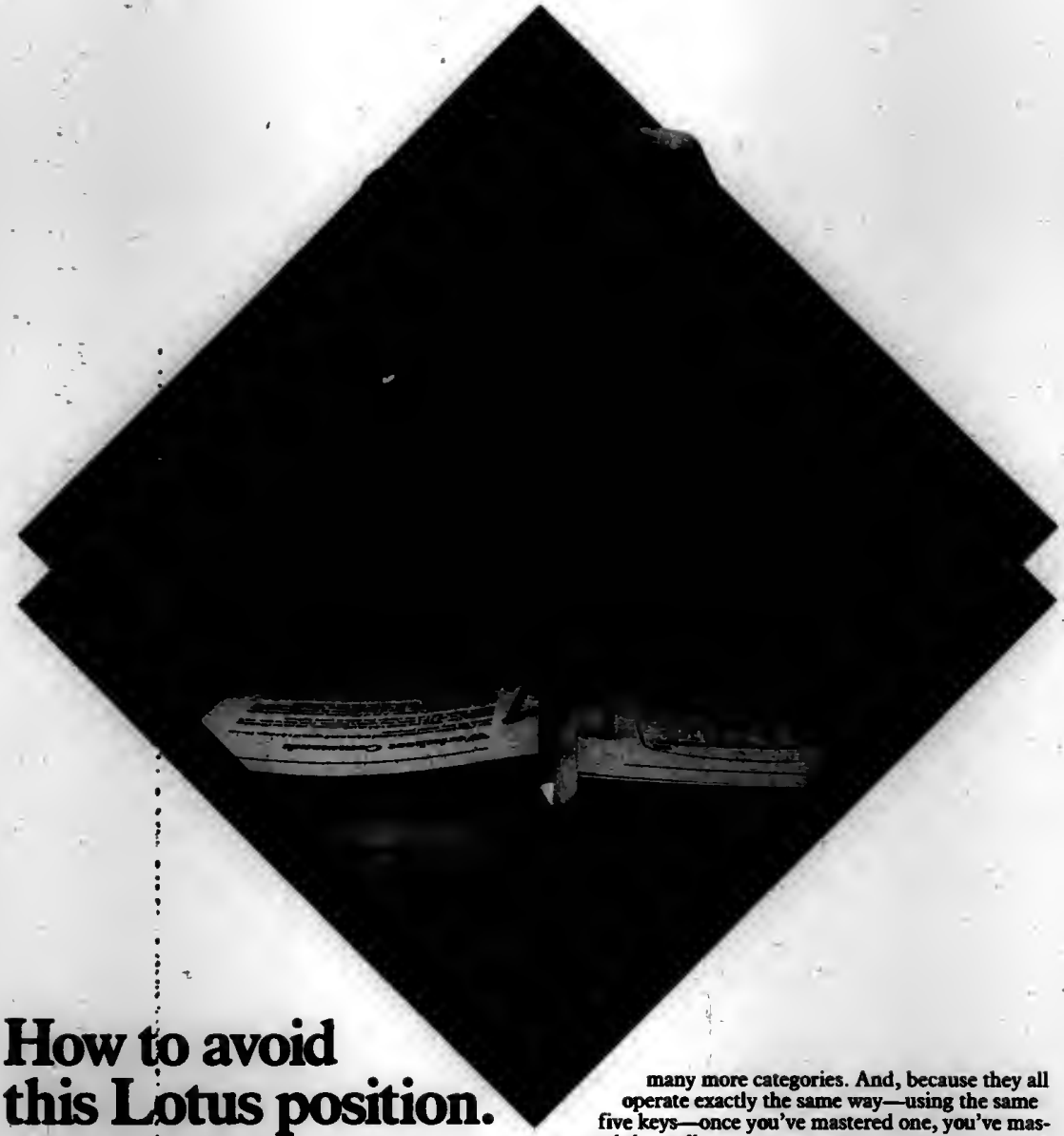

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THE EXECUTIVE DECISION MAKER

By Louis Boyle

A new breed of user is emerging in the microcomputer world: the senior executive who finds the micro a strategic tool that gives him powerful leverage in manipulating information. Not only are micros used on behalf of these executives, but more and more top managers are putting micros to work themselves.

Especially at the senior levels, managers often search for information while drowning in data. A good microcomputer-based decision support system, whether simple or sophisticated, helps them sort the wheat from the chaff.

The most common decision support software is spreadsheet packages. More often than not, data is re-entered into the micro from its original source as opposed to being downloaded — although the more sophisticated uses involve completely automated extraction from a mainframe data base, some reformatting and summarizing, then downloading to the micro. In either case, only rarely does the executive become involved in making the data accessible; he has neither the time nor inclination.

The Microcomputer Consulting Group at Arthur Andersen & Co. recently commissioned a survey to discover how executives felt about personal computing. The survey covered 151 large organizations (annual sales averaging $133 million) and 157 small ones (sales from $1 million to $10 million). It zeroed in on executives who played a broad policy role within their organizations.

Although the geographical coverage of the survey was limited to the Southwest, further research across the rest of the U.S. and Canada

confirms the general trends reported.

The overall results are unequivocal: The micro has gained widespread acceptance by decision makers in all the major business sectors: manufacturing, wholesale trade, retail, insurance, health and social services, transportation, government, construction, finance, utilities and communications.

Micros are very conspicuous, used in 57% of companies overall and 73% of the large companies. Significantly, roughly one in three executives has a micro on his desk; 23% have one at home as well.

An overwhelming 93% stated their micro's performance is meeting or exceeding expectations.

Again, the major application (in 59% of the large companies surveyed) is decision support: providing an information and analysis infrastructure that supports much more informed decisions. This area covers budgeting, finances, what-if analyses of all types and general accounting (especially in smaller organizations).

The other main uses are word processing (45%) and operations control (inventory, distribution, production, labor, 27%).

The primary area of concern was to get a system that responded specifically to the user's anticipated needs; additional concerns relate to education to ensure proper acceptance and usage of the micros. Compatibility with existing systems (hardware connectability, ability to move data between the micro and the mainframe, interfacing to internal and external data bases) is also a significant issue.

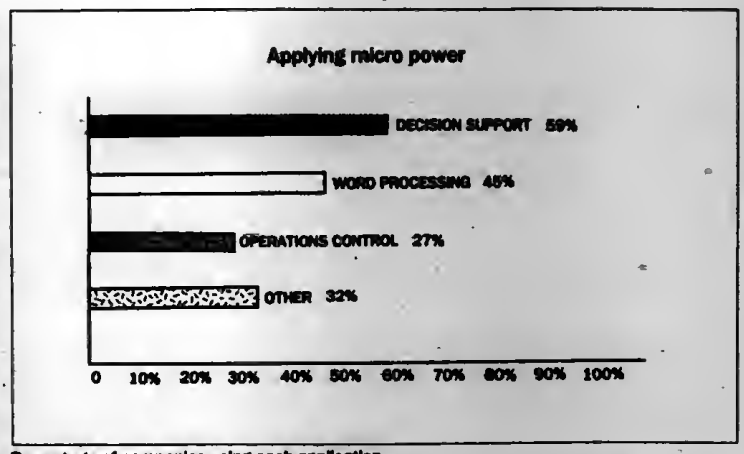
The decision-making process depends more and more upon an integrated view of the business and how it affects, and is affected by, the outside world.

In action

At Arthur Andersen, the majority of the staff uses micros every day. There is one micro for approximately every 10 professionals. Plans call for one on every desk. One of the senior executives using a microcomputer is Vic Millar, who holds worldwide responsibility for planning, defining and integrating Arthur Andersen's three practice area divisions: accounting and audit, management information consulting and tax.

Millar uses the micro to reference individual office and division operating statistics. This system is basically a menu-driven key factor reporting system that presents data in both tabular and graphics format. The system replaces a voluminous series of cumbersome report books and provides a much wider scope of information and deeper levels of detail.

The bottom-level detail data is generated by transaction systems running on the firm's mainframe computers. Information Builders, Inc.'s Focus package is used to extract and summarize the data; then it is downloaded to an IBM Personal Computer with an attached 20M-byte hard disk drive, where Information Builders' PC-Focus is used to build the operational data base.



Percentage of companies using each application.

The micro data base is then transferred to a similar Personal Computer (without the link of hard-copy output devices) in Millar's office.

The data available to him is a series of key operating factors at the division within an office level, as well as consolidations of this data at the office, area, country and region level and across division levels. Actual and budget information on partner profitability, chargeable hours per employee and so on is kept on a monthly, year-to-date, prior year and summary annual data basis.

Millar uses this data to gain a better understanding of the quantitative side of the practice in his contacts with the offices around the world. He is thus much better equipped to discuss trends and performance (both absolute and relative to peers) at all management levels.

Homework

The chief financial officer of a large transportation company, who has very heavy demands on his time during the day, is becoming accustomed to using a micro by working on one at home.

A basic course, covering Microsoft Corp.'s MS-DOS and Lotus Development Corp.'s 1-2-3, gave him the background he needed to start understanding the ins and outs of the machine. He spent long hours on nights and weekends gaining a basic understanding of the machine's capabilities. He produced graphics, bar charts and spreadsheet analyses for personal budget, financial and tax planning applications, then went on to word processing and simple business applications, such as key operating statistics, sales analysis and so on.

Within a few months, he could set up more sophisticated business applications, using data on his corporation's mainframes that would be downloaded to the micro.

■ At the U.S. Navy Headquarters Command Pacific Air Fleet, Zenith Data Systems Corp. micros connected via a Sytek, Inc. broadband local-area network serve as electronic mail terminals among the officers of the command. The entire network is secured for confidential message traffic.

■ Daniel Sasson is the Montreal branch manager of Crowntek, one of the largest computer service bureaus in Canada, which recently moved into a line of micro services to provide integrated solutions to its clients. Sasson uses a portable Grid Systems Corp. micro for marketing analyses and follow-up, for tracking prospective customers and for writing internal memos. He is now using the micro's data base, spreadsheet, graphics, word processing and mainframe communications capabilities, as well as a number of application interfaces (data base to word processing, data base to spreadsheet tables and graphics, mainframe downloading to the data base).

Sasson has set up some applications himself: his branch operating budget, status reports (including graphs) to his management, revenue status/tracking by client and salesman, forecasting via historical trend analysis, weekly sales reports by salesman and monthly performance studies of mainframe usage.

Louis Boyle is the director of management information services at Future Electronics, a manufacturing firm in Montreal. He was recently a senior manager in the Montreal office of Arthur Andersen & Co.

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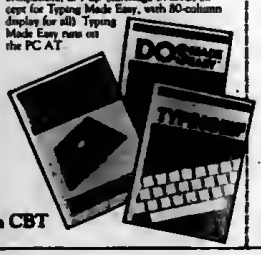

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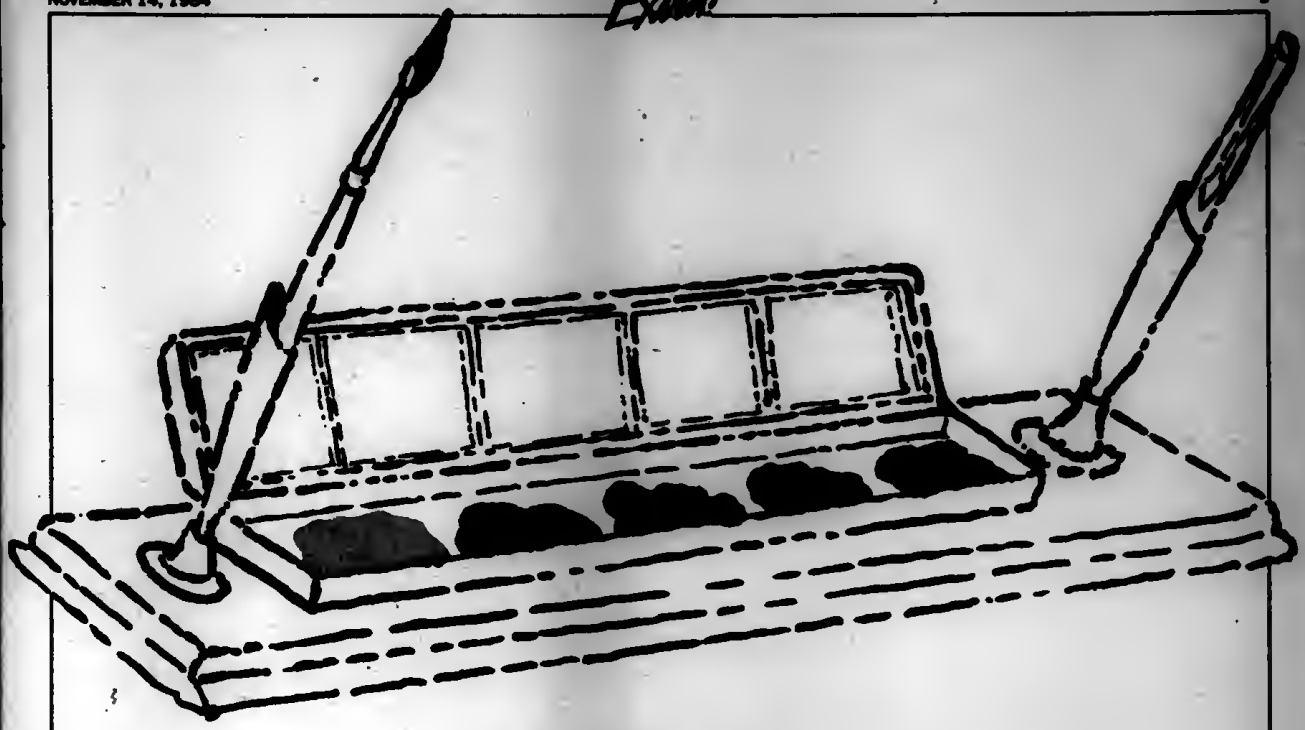

THE EXECUTIVE PALETTE

By Alan Paller

Is business graphics just the executive's Atari? For some middle- and senior-level executives, yes: Graphics happened to come with the computer package and occasionally generates a pretty chart.

But with the spread of micros and computer literacy, business graphics is moving rapidly out of the toy store and into the executive suite.

The use of computer graphics to manipulate business data into more readily understandable forms for decision making and to produce high-quality presentations is only now gaining the widespread acceptance it deserves. It is clearly one of the most dynamic sectors of the computer graphics industry.

When computer graphics appeared on the scene in the late '60s, it was used primarily to analyze data and convert it into charts for easier communication. Because the resolution was low and the graphics were of poor quality, primary applications were internal. Company analysts cared little whether the charts they studied were pretty, as long as they helped them understand the data they needed to study. Similarly, management didn't look for brilliant color in charts. Managers looked for indicators of developing problems, missed opportunities or clearer, more useful information formats.

Then in the late '70s, the new generation of hardware could produce graphics of superior quality in a broad selection of colors. At the same time, advances were made in graphics software. All these breakthroughs sparked a revolution and brought about a dramatic increase in the

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acceptance of business graphics. Suddenly, computer graphics began appearing in slide presentations for both internal and external audiences. Producers responding to this interest stepped up their research and development efforts and new product introductions, all aimed at providing new, improved and less expensive hardware and software.

Presentation graphics for board meetings, sales promotions, management briefings, reports to stockholders and a variety of other uses accounts for about 45% of the business graphics market. But as effective as this use of business graphics may be, the real payoff for corporations is the ability to access large amounts of data for decision making.

The desktop graphics terminal or personal computer is the key to the success of management graphics.

Presenting this data in a visual format makes it easier to understand and actually helps executives "see" the meaning of the data and respond with better decisions. This use of computer graphics, known as management graphics, is growing even faster than presentation graphics.

Use of computer graphics in business saves both time and money. At Pepsico, Inc., for example, senior finance officers formerly spent five days each month poring over huge printouts. When the company began using computer graphics for financial analysis, that data was presented in 650 slides per reporting period, and management time spent on analysis dropped to one day per month. In addition, the graphics presentation of data enables managers to identify more easily areas of potential cost savings.

The desktop graphics terminal or personal computer is the key to the success of management graphics. Increasing numbers of managers are discovering that a personal computer can be as useful an executive tool as a telephone or a calculator. Personal computers are turning up in large corporations on the desks of senior managers, plant managers, financial controllers, sales managers, quality control managers, customer service directors — the people who make decisions that affect growth and productivity.

Developments in computer graphics hardware and software in the last 18 months have enabled corporations to take a giant step forward in the use of business graphics in decision making. The introduction of the IBM 3270 Personal Computer in 1983 and of the 3270 Personal Computer/G in

Painting a picture of company sales.

PLANNING GRAPHICS?

So dynamic is the growth of business applications of computer graphics that the National Computer Graphics Association (NCGA) will sponsor two conferences in 1985 emphasizing business graphics — one in Los Angeles June 25-27, and one in Boston Aug. 13-15. Educational sessions will cover the many facets of business graphics, including management and presentation graphics. Introductory sessions will help companies that are moving into the use of computer graphics. The exhibits planned for each event will enable participants to get hands-on experience with the best equipment available.

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Either before or after transmission, users can ask for help, display directories, toggle between the host system editor and the FTP menu, display and alter file attribute settings selected by FTP, list a PC file, or exit to DOS.

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the spring of 1984 heralded the age of business graphics as a management tool. The systems can deliver information directly to the executive's screen, quickly and in a graphics format that makes the data easy to understand.

The concurrent development of higher quality, lower cost output devices has increased the potential even more. Laser printers that hit the market this past summer can produce high-quality charts and graphics. Film recorders can convert data into presentation-quality slides. The cost of this hardware has plummeted from $40,000 to $10,000 and may be $5,000 by year end. In many cases, these devices can be connected to the mainframe so that every terminal within the corporation has access to high-quality slides and crisp black-and-white prints.

Chevrolet's graphics system saves a full week in the research and development cycle. Charts are ready for review one day after tests are run.

Easy accessibility to high-quality, low-cost graphics is changing the way companies do business. For example, when Monsanto Co. attached a film recorder to its corporate mainframe, managers quickly learned the value of computer graphics in information sharing. In the first two weeks, requests for graphics in 35mm format went from none to 25. In the second two weeks, they increased to 75, and at the end of three months, slide requests averaged 750 per week. All this happened before the company made any formal announcement of the equipment's availability to staff.

Use of computer graphics can dramatically reduce the time elapsed between gathering data and receiving analysis of that data. At Chevrolet Motor Division of General Motors Corp., for example, track tests of new car models are run every Tuesday. The tests generate thousands of pieces of data.

Before Chevrolet had a graphics system to chart this data, graphics technicians converted the data to charts by hand. The test results were ready for review on Wednesday of the following week. Since the graphics system has been installed, the charts are ready for review the day after the tests are run — saving a full week in the research and development cycle.

Better decisions

Computer graphics systems not only save time in arriving at decisions, but they can also help executives make better decisions. Dow Chemical Co. buys petroleum on the spot market. The decision whether to accept an offer is highly complex and requires consensus of three corporate officials in Houston, New Orleans and Midland, Mich. With computer graphics, Dow can send the analytical data in chart format to screens at all three sites so that the decision makers can view it simultaneously. In the 60 minutes they have to make their final decision, they can quickly study the data and arrive at a consensus by phone. Tens of millions of dollars depend on their making good decisions. The graphics system allows instant access to the best data available upon which to base those decisions.

But the revolution in the use of business graphics as a management tool is just beginning. Because the IBM 3270 and the 3270-PC/G are terminals as well as personal computers, they can give an executive direct access to data on the corporate mainframe. While systems of the past enabled executives to keep track of corporate activity in specific areas, the new hardware and software offer the potential to create much larger visual data bases.

Some of today's business graphics software provides on-line visual access to that data. Rather than having to rely on analysts to create visual systems, executives can call up the data they need to make a decision, project growth, analyze the market and evaluate sales — all at the touch of a button.

Growth in development of business graphics systems should top 40% per year through this decade, with mainframe and microcomputer software the fastest growing segments. Better software and lower cost hardware will put computer graphics within the reach of greater numbers of executives, even those in relatively small businesses.

Business graphics is a dynamic market. Advances by manufacturers of hardware and software warrant attention. But the real action is taking place in the executive suite, where business graphics is helping executives make better decisions to the profit of their companies. Their innovative applications are a driving force in the development of this vital industry.

Alan Fuller is president of AUI Data Graphics, a subsidiary of Integrated Systems Corp. in Arlington, Va. A board member of the National Computer Graphics Association, he will chair its conference on business graphics next year.

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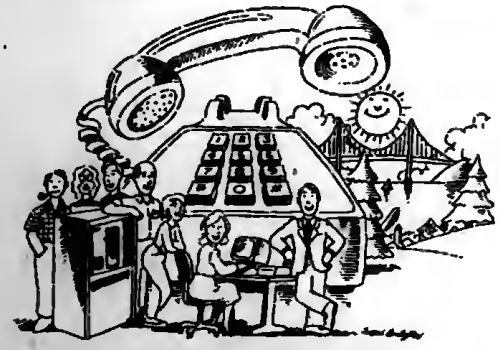

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Protecting young artists's records or rights to promote their performers is an interesting idea. How do you equate the two?

MICHAEL MEYER

dele Goldberg has worked for the past 11 years at the Xerox Palo Alto Research Center, where she helped develop Smalltalk.

What are some of the issues that drive your work as a researcher?

Goldberg: The world is always changing and will continue to change. In order to keep up with and understand these changes, we must have tools that can help us get the information we need. Having access to information is the key to individual power; no matter how complicated the world

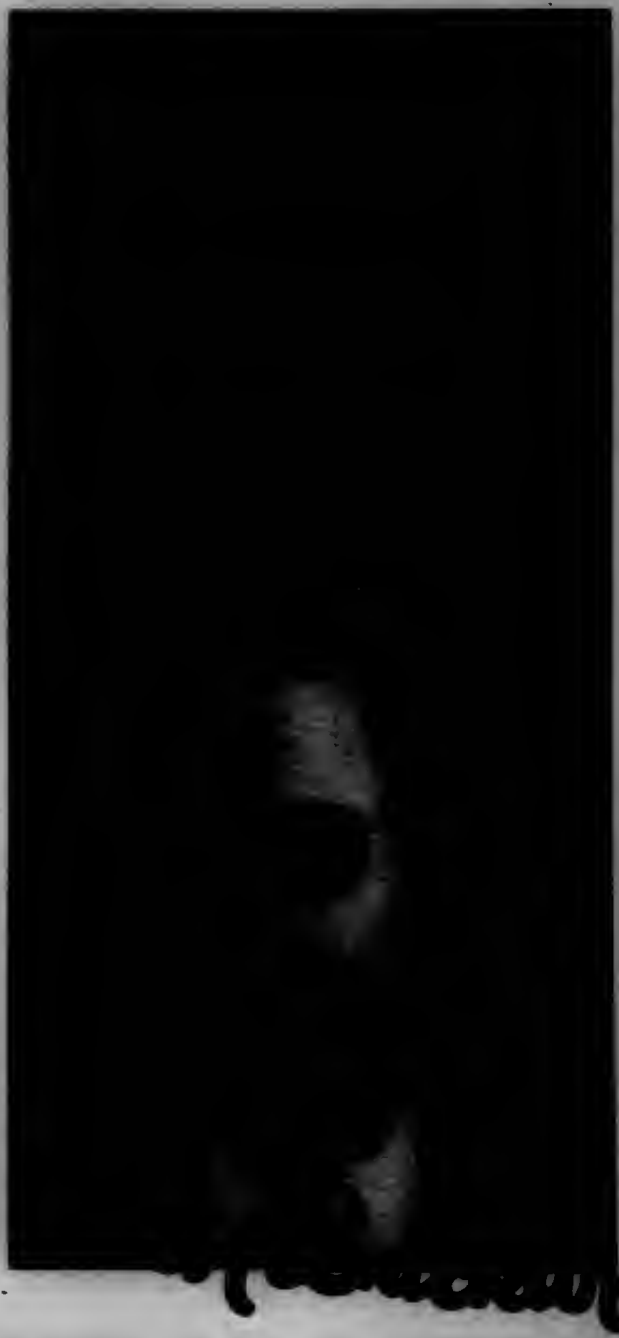
(Continued on Page 18)

40

They helped launch the industry — four people under 40 years old who profoundly affected how microcomputers are used and marketed.

Priscilla Burgess, a Stanford, Calif., writer, interviewed the four about the rapid growth of the industry, their particular contributions to it and the direction of microcomputer technology.

Each one represents a different facet of the industry: Trip Hawkins was responsible for marketing Apple Computer, Inc.'s Apple II and, in doing so, defined how micros are sold and serviced. Adele Goldberg was part of the team that created Smalltalk, which inspired Apple's Macintosh and influenced the use of icons and windows today. Steve Leininger developed Tandy Corp.'s TRS-80 Model I, one of the first micros on the market. Dan Bricklin created Visi Calc, giving business people a reason to use micros — and incidentally, launched the market for "Visi Clones."



HAWKINS

(Continued from Page 14)

them themselves. We try to give programmers the credit for their products that they deserve.

The philosophy I base this on is that the computer is a new medium of communication, much like film, television, audio or book publishing. It happens to be a pretty impressive medium, and it's a creative medium. The best work is done by people with real creative talent who are able to exploit the power of the computer. These creative people feel the same way about their work as artists in other media do.

So you are not developing software yourself, but finding people who already have products that you think are marketable?

Hawkins: Actually, we have a very flexible approach to where the next great product will come from. Sometimes we come up with an idea and produce it, and other times we will market software that has already been developed.

One of the things we have learned is that software is not really a publishing business. In the book industry, there is very little value added in the creative process. When the writer has finished writing, the publishing company simply makes sure there are no typographical errors, prints up thousands of copies and it's done.

When you are dealing with software, it is much more difficult getting to where you want to go. You may have a terrific idea, but producing the software requires a lot of knowledge about design, computers and the user interface.

How did you happen to be at Apple at such a crucial time?

Hawkins: While I was getting my MBA at Stanford, I did market research on the computer industry in Silicon Valley. When my last study was published, I had correctly forecast that Radio Shack would be the industry leader in 1978. The people at Apple were upset and called me to complain. In the course of the conversation, I mentioned I was looking for a job. Apple was a very high-quality operation with very bright people, and I felt that they were the kind of people I wanted to work with.

Where was Apple in terms of its development?

Hawkins: It was just before they started to sell disk drives, which changed it from being limited to a hobby business to a business with a lot of other possibilities.

What do you feel your contribution to Apple's marketing effort was?

Hawkins: The first thing I was assigned to do was to find out what people were doing with Apples. After a lot of research, we came to the opinion that we could sell the Apple II to the business world if we developed a more powerful machine. So, in 1978, Steve Jobs and I wrote the first proposal for Lisa, as an inexpensive, office desktop product.

Most people thought that small businesses would buy them for accounting applications, but I argued that there were a lot more desktops out there than there were small businesses. And accounting is a complex application that is not that well understood by the businessmen themselves.

What kind of use did you envision?

Hawkins: Word processing was the primary element. I identified the second application as a formatter calculator for financial planning and tables. I was essentially describing [Software Arts, Inc.'s] Visi Calc.

In our original proposal for the Lisa, we wanted it to come out at a retail price of $2,000. Of course, by the time the engineers got through with it, it cost a lot more than that. But now with the Macintosh, the price is closer to what we wanted it to be.

For the next year, I drew up the business plan to get the Apple II into the business market. That involved developing a plan of attack and signing up software products for the Apple II. That is when I started my career as a software talent scout. We got a retail store inventory package, an accounting system, Apple Writer, and I provided support and the operating system for the first version of Visi Calc. In the summer of 1979, we launched the first field training program to promote the software.

What are some of your other contributions?

Hawkins: The idea of a walk-in retail computer service, so that people could bring their computers in to be fixed rather than sending a repairman out to the customer's location. This approach was imitated by the entire industry.

Another thing we pioneered was the idea of having an 800 telephone number for toll-free support for software products. That was my idea, and it worked really well. Seminar selling was another idea that brought down the cost of selling the computers to people in the business world.

Then I became the product manager for Lisa. At that point, it was a disaster. It looked nothing like what it is today.

Was that the result of your initial proposal?

Hawkins: No. While I was off working on the Apple II, engineering went off and completely redesigned it. I identified some of the problems and some better directions at the time when Steve had visited Xerox [Palo Alto Research Center] and seen Smalltalk. He took six of us back up, after which we incorporated a lot of the ideas into the Lisa.

With IRMA's latest innovation, a remote PC can reach the mainframe when all the ports are full.

Unfortunately, the Lisa ended up coming out very late and was very expensive.

Hawkins: But they sold about $100 million in the first year, so everything is relative. From an engineering standpoint, it was two years late, because it was started well before the IBM Personal Computer, and Lisa was scheduled to come out before it. By the time the Personal Computer came out, it was much too late to change anything. If I had still been there, I would never have let them go out the door with the price they did. The high price, the IBM Personal Computer and the fact that Lotus [Development Corp.'s] 1-2-3 was just around the corner really hurt the Lisa.

For which computers is your company designing software?

Hawkins: Our strength is really in the home machines like the Commodore [Business Machines, Inc.] 64, the Apple II family, the Atari family, the Macintosh and the IBM Personal Computer. We are going to become the No. 1 supplier for the new Commodore machine — Commodore has acquired a company called Amiga. We are very excited about that machine. It's exactly the kind of computer I started Electronic Arts to make software for.

What are your general impressions of the market today? What do you think about the turmoil?

Hawkins: On the business side, the market has gone through a very simple stepping-stone process. It started with the Apple II and Visi Calc. Then the IBM Personal Computer and Lotus 1-2-3 came out and provided better tools. The Personal Computer has taken over the dominant role in the corporate market.

The retailers have always had a hot item to sell over the past four or five years and haven't really stretched out in new areas. They haven't learned to sell to new markets effectively, so this year that market has slowed down a bit. There haven't been as many people out to buy spreadsheets, and a lot of retailers have been losing money.

On the consumer side, video games took off without anyone understanding why. It was a fad. The machines had no growth path, and the games were not that interesting. At the same time that was happening, the really inexpensive computers came out promoted by ads that tried to make parents feel guilty. Pretty soon they realized that the computers didn't do anything. So now you have disillusioned retailers who have been burned on video game inventories and then on cheap computers.

There has been a shake-up in the software business as well. There had been a very carefree attitude on the part of the manufacturers, so much of the software was filled with problems. The consumer is demanding a better quality product, and a lot of the companies that produced shoddy goods are going away.

I think that this year the home computer industry is going to be no bigger than it was last year. At Christmas, there will probably be $50 million spent by the home computer companies to talk about good products.

A lot of consumers are going to discover what home computing really can be for the first time.

What do you think home computing can be besides word processing?

The computer is the medium of doing, which sets it apart from other media such as TV.

Hawkins: There are two categories. The first is looking at the computer as an appliance. An appliance is something like a dishwasher; you push a few buttons and you get a result. And if the price of the result is low enough and it saves you time and money, you buy it.

The computer has a revolutionary aspect in that every time I put a new disk in, I can turn it into another appliance.

A program to balance your checkbook or look up recipes really doesn't save you time and money, but other products do. Word processing is a good example.

How do you see the industry developing?

Hawkins: Telecommunications is going to be very important. I think there is going to be a real interest in using the computer as a way to link up with other people.

The computer is a new medium, and it is the medium of doing, which sets it apart from other media like TV. The aspect of interaction is important because it is compelling and involving, and it can offer dynamic feedback instantaneously. For example, the best selling product on the market right now is [Sublogic's] Flight Simulator. It is really exciting to fly an airplane, and to be able to do that on your home computer is fantastic.

Do you feel that the philosophy of your company has had an impact on the industry?

Hawkins: I think it has had an impact, but the impact hasn't been fully felt because there are still a lot of people who have not seen our products.

As long as I can show our products and they say, "I had no idea you could do this with a computer," I know that I'm still a missionary.

It's a sinking feeling indeed.

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GOLDBERG

(Continued from Page 14)

becomes, you can feel you are in charge because you are capable of finding out what is going on.

However, if you create something for yourself that helps you understand your world and it is shared in the business or government marketplace, it will be used in different ways. So you have to make sure that you present it in a way that encourages people to use it the way you hoped they would.

You have to believe that when you come up with something that really helps people, they will use it in a positive way. If you don't believe that, then you can't do research.

In the early days of the microcomputer, people seemed to delight in the thing itself. Now these same people tend to be looking at how micros fit into society.

Goldberg: The focus of personal computing as an individual working with the technology had good qualities to it, but it misled us down a pathway of worrying about the device. Alan Kay said once that as long as the computer dominates your attention, then you don't have something that supports interpersonal communication.

It's people who are interesting: what they know, their comments and opinions.

We do have telephones.

Goldberg: That's right, except that suppose there's one person who knows something you want to know and there are 1,000 other people besides you who want to know that, too. How reasonable is it to occupy that person's time with 1,000 phone calls when the question is always the same?

We are very interested in the nature of the shared information space — I won't call it a data base, because data is the wrong word — that allows a dialogue to be stored and then accessed and used by others. The purpose of a microcomputer is not so individuals can be alone, but so that individuals can have a broader world in which to interact with other people.

It sounds great, but that is not what is happening now.

Goldberg: No, we're not doing it right now, and there is a reason for it. It has to do with what the marketplace can sell. What is being sold? Office tools that will make individuals in offices more productive. Because we are using an electronic device, we think that people should be able to do more faster. There is the illusion that the machine is doing most of the work, while the human is simply monitoring it.

This whole question of productivity is really misguided, because we don't know what we are measuring. We don't understand human expectations and human constraints.

How do you feel about the success of the Macintosh?

Goldberg: A lot of people have asked if I feel badly that Xerox wasn't the one to produce the Macintosh. The answer is yes, of course. All of the elements of the Macintosh were derived directly from research done here. But of course, Xerox did produce the Star for a different marketplace. It does disappoint me that we were not in the market I would like to be in, but I knew that when I joined the company. The point is, Steve Jobs was smart enough to recognize a good idea when we showed it to him — and that's nice, that's a compliment.

But wasn't the point of sharing Smalltalk with the industry to get other manufacturers to use it?

Goldberg: Oh, absolutely. Well, let's see. There are different levels of sharing. When the Star was announced, everyone got to see the level of user interface we had developed, and that was not an issue. The only way we were going to get people working on the hardware was to get the software out there as a different direction for people to think about — not as an end, but as an evolution. In order to encourage an evolution, it takes lots of people competing, sharing and interacting with one another to solve these problems. Our goal was to share the software to get people to help think about the hardware.

What do you think about the way the Macintosh works?

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Goldberg: You have to spend too much time shuffling those diskettes around. I got beyond the pretty icons right away, since it was all essentially an adaptation of something I had been using for years.

There are microcomputers for different kinds of people having different needs. We don't think that everyone can wear the same dress any more than they can all use the same computer. So one of the things that I think the industry has to move toward is hardware and software "pluggability."

All systems need to be open systems, with modules that can be plugged together in a rational way so that we can have a variety of devices but still have the same functionality.

Your ideas could very well be carried out by IBM alone. There are at least 35 companies making Personal Computer look-alikes, and it could end up being the standard. Yet a lot of people don't think it's such a wonderful machine.

Goldberg: First we have to realize that there will be lots of variations in hardware and software and in the interface among them, either for a long time or forever.

The marketplace and the need to make money drive people to pick certain circles of standards. In the computer industry, there is the philosophy of the open system and the closed system. With the Macintosh, Apple turned its back on open systems, which was one of the things that interested people in Apple and especially the Apple II. You could plug almost anything into it and take it apart.

And what did Apple do with the Macintosh? It went 180 degrees the other way to a completely closed system. And if you wanted to develop applications on it, you would have to use nonstandard languages on Apple's own development system. Within less than a year, Apple had to change its tune on that one. People don't like that. They want to have choices.

The IBM Personal Computer is interesting because IBM simply put out a core system, which was not fascinating, but had a couple of things different enough about it to be attractive. First was the IBM logo — the company that businessmen believe in for service and longevity. The second thing IBM did well was that by coming into the marketplace late, it provided an open system. IBM was not going to do everything, and it invited everyone to join the bandwagon.

We are going to see IBM come out with a Unix system and its own window package, because it is not quite sure what is right, either. So there will be some variety in what the company produces. IBM has always been willing to try something new, but it is a little bit more cautious and conservative.

Afterward, it may shut everybody out, which will make a lot of people and companies mad. One of the things that has always been exciting about the American marketplace is the variety of companies that give you choices. Users may go to IBM because they prefer that choice, but they like the idea of having the choice.

What do you think the next step will be?

Goldberg: The next step is thinking of information in the sense of a library. You have a library in your home, your office, your community, your city and your state. There are levels of libraries and, depending upon how important it is for you to get information, you are willing to pay the cost of following the pathway to get it.

In the same way that we have levels of libraries, we will have levels of networks. One of the hardest problems to think about and understand is that the workstation, the node on the network, is the doorway into getting, using and exchanging information.

When I talk about interpersonal use, I don't think of access but of information exchange. The computer is a door, and through that door one travels on a pathway heading for somewhere else. On the way, one can visit other places — other way stations that offer electronic services that help you in some important way.

There are lots of things that just plain cannot reside in your microcomputer. So not only do you want to travel the pathways to get at stored, static information, like encyclopedias of the world, but also you want to get at the various kinds of information that give you power over your own life.

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LEININGER

(Continued from Page 15)

A lot of us worked in semiconductor houses, and we were aware that one way to reduce costs was to put everything on one board. It was inevitable that someone was going to do it. It wasn't so much a cold, calculating kind of thing as in today's business. It was more like, "Boy, this sure seems like fun." It was a very exciting group of people.

There were three computers that came out about the same time: the Radio Shack Model 1, the Apple II and the Commodore Pet 2001. They came out within two months of each other, and those three machines really set the world on fire. They were all relatively affordable; they all had Basic and ROM [read-only memory]; they all had video electronics built in; and they all used a cassette recorder for data storage. They were all developed independently, but they were surprisingly the same.

We were all at the right place at the right time. Anyone who tells you that wasn't a factor is blowing some smoke. You don't see as many 24-year-olds doing what we did back then. We didn't know any better. We didn't know that you couldn't do it.

After the Model 1, what did you produce?

Leininger: We turned out the Model 2, which was Radio Shack's first real business machine. The Model 3 evolved into the Model 4, which is still being sold. We have a very small engineering staff at Radio Shack, so most of our color computer came from Motorola and the Model 100 from a Japanese company. Since then, my input has been on a grander scale — horizon shots and things like that.

How does the Macintosh compare with your computers?

Leininger: The Macintosh is a great machine — with no software yet. The software issue is getting better, especially now that Apple has the Fat Mac. It was announced with very little fanfare. I found it in a crack in a no-big-deal article somewhere, which is kind of amazing to me. Of course, maybe Apple doesn't want to stir up everyone who's got the 128K ones.

The one thing Apple should get a lot of credit for is the fact that it is going out and plowing its own ground. It's like growing asparagus. It takes three to five years before you can harvest any of it. Apple has been working on the Macintosh since back in the Lisa days.

Apple's done the first brave step in burying the operating system. I applaud the company for that. You are hacking around when you're playing with an operating system.

Now if you really want to give credit, you need to give credit to people like Alan Kay and some of the other people out at Xerox Palo Alto Research Center for actually doing the icon-and-mouse-based interface.

How does it compare with what you are doing?

Leininger: We don't do things to that great a depth. We have a very small staff, and if you consider the number of products we have in the stores that we have designed in-house, it's an astounding number.

So you're not doing much research and development. Do you feel you are dependent upon existing technology?

Leininger: You have to consider that everything in the Apple is existing technology, too, except for perhaps the software. We sometimes buy software technology rather than develop it. Since we are a very high-profit-margin company, we tend to have cash available to purchase things, such as the Model 100.

Do you rework it or take it as is?

Leininger: We put our colors on it, and we had major input into the software. One thing you need to learn in this business is to build on good parts that others have and fix their bad points. In the case of the Macintosh, what Apple is doing is taking the Lisa and making the thing portable.

What do you think of what IBM has been doing with the Personal Computer?

Leininger: To say it's a crummy machine wouldn't give me too much credibility.

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IBM has a funny place in the market, but it's getting to the point where that market is becoming saturated. People get in trouble when they don't assume that IBM looks at other products and implements good ideas. It does it in a very slow and cumbersome way.

There's no question that an IBM is a computer. There's probably not a whole lot of question that an Apple is a computer. But given a choice between an Apple and an IBM, if you weren't very knowledgeable about the industry, you know IBM makes computers — Apple you're not really sure about.

I think the Macintosh is a great machine, and I think the IBM compatibles business is very, very, very dangerous. If you look at mainframe compatibles, like Memorex [Corp.] or Storage Technology [Corp.], IBM always takes them for a fast sleigh ride. It's like Mr. Toad's wild ride at Disneyland — except that the corners are sharp enough to make you fall out.

What will happen with the microcomputer in the business world?

Leininger: Microcomputers in the business world won't be much different for some time. I'll have to give it 10 years before it finally matures into a full product. It is pretty good now for the specific uses we talked about, but it's going to be like the telephone. You don't get all excited about your telephone anymore, but if you consider the technology behind it, it is pretty impressive. The local-area network staff is fine, but the beauty of the telephone is that you can call from California and you can talk to me in Texas. It is an incredible tool. And, really, the phone isn't the tool; it is the network that is the tool.

Are microcomputers as useful as they could be?

Leininger: If you do any kind of word processing, it pays for itself. That's mostly what I use it for. If you do any kind of spreadsheets, it pays for itself. Other than that, there are lots of people who don't need computers. One of the big myths is that computers replace all the paperwork, when what they really do is generate more paper. People haven't reached the point where they would rather have it on a CRT than a piece of paper.

Where do you think the business is going to end up?

Leininger: I think we will end up with a few standardized types of microcomputers. And it will become more of a software business. I think IBM is going to do a very good job of maintaining its dominance in that part of the marketplace. Apple's got a very good chance of staying. Radio Shack, due to the fact that we have 9,000 stores out there, has got some critical mass that's hard to overcome.

When we first started this business, it didn't really matter what the computers were used for because people just wanted to have computers. We know what some of the applications are now, and those are pretty well taken care of, like word processing and spreadsheets.

For the industry to grow, I think people need to start taking a look at what people actually do at work and at what would make it easier. Computers might not necessarily be the right answer. They sometimes get in the way.

What would you like to see happen with the software for your computers?

Leininger: I guess one way would be to have a computer with Macintosh kinds of functions built in. That's a tall order, but if you take a look at some of the clever stuff that's come out recently like [Living Videotext, Inc.'s] Thinktank, which is an outline process, you'll see that there are some new classes of software coming out. I would like to see our Model 100 with all the software built in.

What is going to happen to the price of microcomputers and the software — do you think it's going to plummet?

Leininger: I think the price of the hardware has plummeted as far as it can for the short term — it's pretty deathly low. I don't think we have begun to see what is going to happen to the price of software. My guts tell me that $49 and $99 are the right prices for business software. Home software ought to be like records — $9.99 max. These are just my own feelings and don't necessarily reflect the view of the corporation.

records received from or destined for the mainframe.

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BRICKLIN

(Continued from Page 15)
uses a computer as a tool to make that job easier.

How do you feel about what has happened with Visi Calc? That you produced something that was innovative and attractive and then saw the multitudes crowding into the field?

Bricklin: That always happens. On the other hand, I'm the only one who is going to be first. Everybody, like the people at Lotus [Development Corp.], admits that we were the ones who blazed the trail.

What do you think of the other spreadsheets? Are they as good as yours?

Bricklin: Each has its advantages and disadvantages. Some of them did not understand the philosophy about creating a useful tool. Those that are most like Visi Calc are the most successful. The one that was closest to Visi Calc was Lotus [1-2-3]. Lotus tried real hard to be like it and to add things that we hadn't added yet. These were things people were asking for but which didn't break the conceptual framework set up by Visi Calc. That's one reason Lotus was successful. Multiplan didn't catch on as well because [Microsoft Corp.] did things a little differently.

Visi Calc was designed to be keystroke-efficient. In other words, it's got to be very natural to use because it may take you some time to learn it — all these things take time to learn — but it really pays off in terms of how easy it is. You are going up against paper and pencil.

I remember when [Sorcim Corp.'s] Supercalc was first being shown. It didn't have some of the very important basic features of Visi Calc, which the company didn't think were needed. It had not been tested, but when it hit the market, [Sorcim] had to quickly throw these features in. We all find it humorous thinking back about it.

What do you think will be the fate of all the companies that are producing similar products?

Bricklin: They all hope they are going to be the one that makes it. The same thing happens in every industry. Every industry has its dominant players, and the dominant player changes from time to time. First Radio Shack, Commodore and Apple were the dominant players. Then the industry started splitting into business machines and home machines, and IBM came into the picture. The perturbations and swings are really wide now as the industry develops. It's harder to change some things because they are starting to get embedded.

Silicon Valley is certainly going through some ups and downs right now.

Bricklin: The semiconductor industry went through that, too. People are always trying different ways of doing things, and some work and some don't. They are taking great risks, and when you take great risks, sometimes you fail. This is especially true when the goal is to be No. 1, and there can only be one No. 1. By definition, you're going to see some falling by the wayside. There isn't enough market for everybody.

Visi Calc has always been a solid performer in the Apple market. There is nothing like TK! Solver, and we just started shipping it for the Macintosh. The Macintosh is a great opportunity for software developers, although it takes a long time to develop software for it. Therefore, most software that is available so far has not been very good. A good Macintosh program is harder than doing a good program for another machine because the Macintosh really shows flaws in the program.

Many people see the keyboard and the screen as a barrier to using computers. They don't want to see a computer, they want to see an appropriate tool.

Bricklin: You have to give people an appealing metaphor. A lot of people, unless they are writers, don't want to think in terms of the typewriter metaphor. They will think in the screen's metaphor if it presents what they are used to seeing on some other graphics medium. That is why spreadsheets were so well accepted: The screen looked like a spreadsheet.

People were really turned on by the Macintosh because

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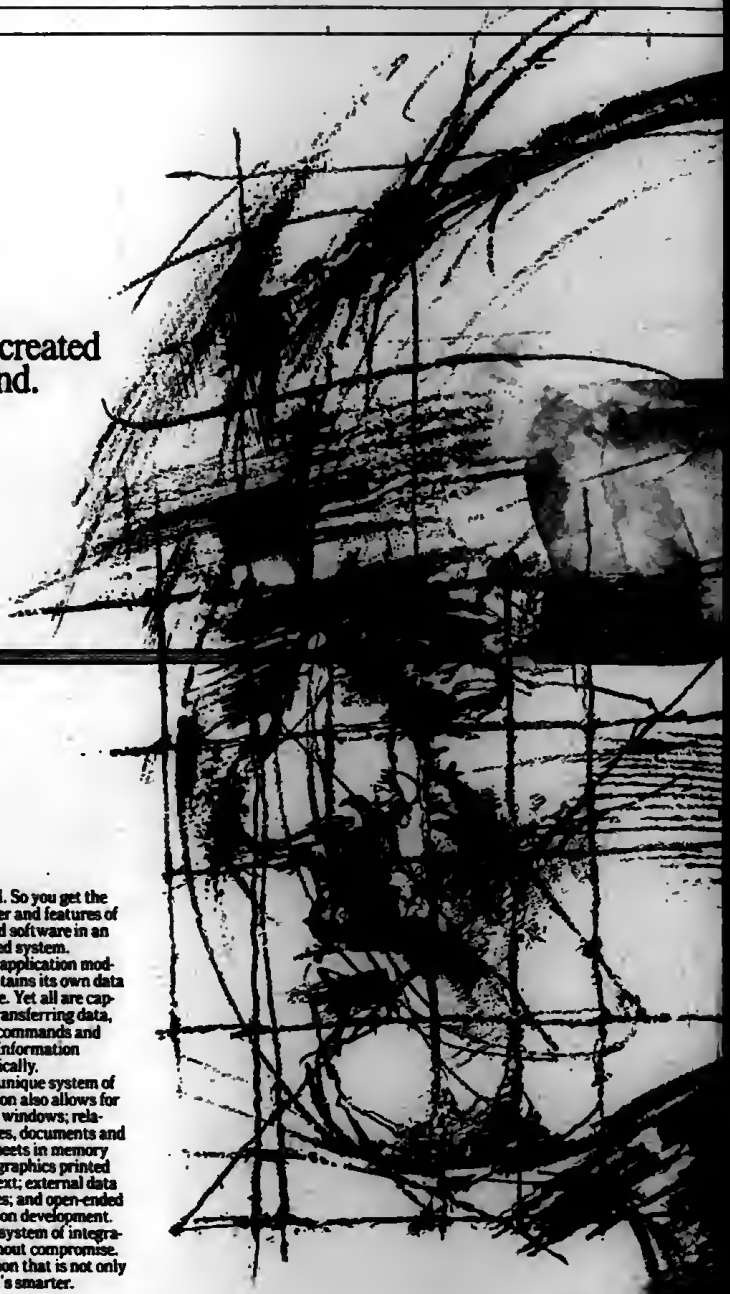

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It doesn't matter what is on the other side of the box. The idea, often, is to have the computer do things as if it were a person — except this person doesn't tire and is very quick.

it looked like something they would like to deal with. A lot of people don't feel that the keyboard looks like what they think they want to do, and they are right. For certain things, typing commands is not the best way. The Macintosh's interface caught the imagination of many people because it is the graphic representation of something physical, like dials, buttons and levers.

What I think is super about the Macintosh is that there isn't one right way of doing things. It's like those little dolls that they make for little kids with snaps and buttons and zippers and ties. In the different Macintosh programs, there are different ways of doing things. In the paint program, you use the hand, and on the word processor, you use a scroll bar. To the user, however, it all feels the same because it all feels natural.

The mouse is a little strange because you are doing something one place and seeing it somewhere else.

Bricklin: For doing a paint program, a mouse is more natural than a keyboard — just as a music program would not be natural with a mouse but would be with a music keyboard. The high-resolution screen, the mouse and these other interfaces are letting us get closer to the natural representation of the task.

Eventually, you would get used to using Macpaint to the point where it would seem natural, and all your old skills would be useful. That wouldn't happen if you were typing coordinates on a keyboard.

One great problem with microcomputer use is that the software seems to require so much input in relation to what comes out. Do you think there is ever going to come a time when the software is so sophisticated that only a few keystrokes are needed?

Bricklin: First, computers are very output-intensive, especially microcomputers, because people expect the screen to be very lively. They don't interpret the amount of output as being as immense as it is. What is important is that the amount of input you are doing feels excessive. Most of the things we do with computers, like word and number processing, require that you input the information into the computer, and that is kind of a drag.

However, once you get into a communications environment, like electronic mail, all the information is already in the computer, and you are only manipulating it. Then a computer becomes very manipulation-intensive.

But you still have to key in the messages.

Bricklin: That's true, I do type my messages, but I only write a few a day and I get a whole lot sent to me. So there is very little typing in and a lot coming out. The interface on the commercial data systems is not very easy, but if you could get that wealth of useful, up-to-date information, it is no longer so input-intensive, it is only manipulation-intensive.

In order to get to that point, somebody has to input a huge amount of data.

Bricklin: Some of it would be originally produced on a computer, so that many people would be doing just a little bit each day. Eventually, the total volume of information that anyone could receive or access would be enormous.

Some of the new input devices will make it easier, too. Wang sells a device under which you can put a picture or document, and it is stored as an image. As storage and

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data transmission costs come down, it will be more common.

It would be even more useful to be able to use voice recognition if they ever figured out how to do it right. When you can store and understand the voice, you can eliminate typing.

The more that original transactions are done on the computer in the first place, the easier it will all be. It is just as easy to produce the original on the computer as it is on any other type of equipment. One of the main reasons we are so input-intensive is that we are switching from manual systems to computer systems. We will eventually be typing everything into a computer, and if you ever need paper, you can produce it — just as the Xerox machine made paper a lot more valuable, because now you can copy a piece of paper and distribute it to many people quickly without having planned to do so in advance. The same thing could be true of computers.

There are advantages to using the computer, but you have to have enough of those advantages to make it worthwhile putting data into the machine in the first place. Then everybody must have a computer and be connected to the networks. There are many reasons for that to occur, and it's slowly coming about. I think that over the next few years, we are going to see more and more of that.

So you are seeing the interconnection of not only homes but businesses with enormous data bases.

Bricklin: The most important thing is to interconnect desks — one person's desk connected with the rest of the group. Then one group connected to another group within the company and all companies connected together. All of this is technology we have now. We just haven't put it all together, because there are so many different standards and so much work getting it all together so that it is easy to use. The hardware technology is there; the software technology is there, too; we don't have to invent anything. It's not like inventing voice recognition — all the pieces are there, but the volume has to be great enough to get the costs down, and everyone has to agree on a standard way of doing it.

Given the commitment we have to the current technology, do you think a computer that is radically different from what we have now will ever be developed?

Bricklin: I don't think it matters what's behind the box. All that matters is that the user uses the things that one normally uses to communicate — like hands, fingers or voice — in ways that seem natural to the senses. Then it doesn't matter what is on the other side of the box. The idea, in many cases, is to have the computer do things as if it were a person. Except this person doesn't tire and it is very quick.

So your view of the future is interconnectedness from person to group to company to everybody — and as human an interface as possible so that the technology becomes less visible.

Bricklin: The Macintosh opens up a whole new realm of how to communicate with a computer. It was designed to do that. They pushed the "enticingness" as much as possible because they want to sell machines. However, it is still uncomfortable for some adults to even think of using a machine, while many of the kids take readily to it.

We still have not truly integrated microcomputers into the home. They are mostly used for word processing and games.

Bricklin: That is because they are not connected. Today, the kind of electronic mail that is becoming prevalent is the answering machine. You always know that you can receive information at your leisure and that it will be received. Imagine if all the people you knew were actually linked together by computer. You could sit there with Macpaint and produce your own really nice message, send it off to everyone and be done. My friends are not on an electronic mail system yet. If they were, we would use it instead of answering machines.

What do you think of the fate of the microcomputer in the business world?

Bricklin: Just ask anybody who uses a personal computer on his desk if he would get rid of it and go back to the way he used to work. Most people will say no. The micro is here to stay.

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40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government—State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User _____
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80 Manufacturer of Computers, Computer-related Systems or Peripherals
90 Computer Service Bureau/Software/Planning/Consulting
95 Computer/Peripheral Dealer/Distributor/Retailer
99 Other Vendor _____

2. OCCUPATION/FUNCTION (Circle One)
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12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
22 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
39 OA/WP Director/Manager/Supervisor
39 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mktg Sales Reps/Sales/Marketing Mgmt
59 Consulting Mgmt
75 Medical/Legal/Accounting Mgmt
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99 Other _____

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D. Communications Systems
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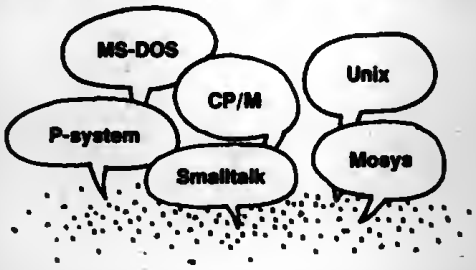
advantage of current technology.

For discussion, consider eight basic aspects: rapport, access, communications, flexibility, portability, reliability, capacity and performance.

Since the primary objective of an operating system is to allow a person to communicate with a computer through a collection of application programs, the human interface, or human rapport, is at the top of the list. If computers are ever to become widely accepted in the general marketplace, there's no doubt that they have to become easy to use. The prerequisite is, of course, that they be easy to learn. Someone once said that computers must become "intuitively obvious to the most casual observer."

Such a system will most likely take advantage of pull-down, noncryptic menus, windowing, bit-mapped graphics and a mouse-controlled cursor. These items have already simplified word processors and spreadsheets, and there's no reason they should not be used in operating system development. Other likely features will include the ability to back out of errors gracefully before information is lost and the ability to use a "scratch pad" to allow information to be passed from one application program to another in a consistent way. Finally, the standard applications such as word processing, data base and spreadsheet should be available as basic functions of the operating system itself. Their operation should not have to be relearned from implementation to implementation.



Access defines the computer's ability to store and retrieve various information. A window to hierarchical directories will be required to find a data object among much larger data systems. These data objects or files should have the appropriate security if they are available in multiuser or networked environments. A supportive file type should include fixed and variable record length, character strings, images, sound, index and directory files.

The operating system should handle these various files by type; that is, image files should automatically invoke graphics systems, sound files should deal with microphones, speakers and sound generators and so on. A multiple-accessed relational data base should be a basic facility of the operating system. Wild card and partial key access should also be included.

Because communications is rapidly becoming a mature technology, it is important that operating systems define standard methods of dealing with this information exchange. Remote access to material over the local or global network should remain transparent to the user, except for the physical limitation of response time. Facilities should be included to handle global communications such as Compuserve, the Source, electronic mail and other modem-based systems in a consistent manner. Local-area networks with even greater bandwidth should contain even more sophisticated facilities. Each user on these networks should be both a server and a client. This arrangement would allow equal exchange of information, files and even devices.

Someone once said that computers must become "intuitively obvious to the most casual observer."

Of course, since this operating system will be inherently multitasking, it would also support a multiuser environment. An appropriate security system is required to limit access. Finally, as noted above, all of these network intricacies should remain transparent to the end user.

For any operating system to avoid being left behind as technology or marketing evolves, it must maintain high flexibility. This is the only way an important operating system can continue to evolve. One excellent method to achieve this flexibility is the use of the "software bus." This would allow the user to plug in various functions and features as required. The operating system should thus be able, in addition, to serve as a host to alien operating systems and read or write their various disk formats. If a routine can be accomplished better in a different operating mode (say, machine language), the operating systems should readily accommodate that interaction. The

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menu front end should be easily maintainable by the application programmer.

Portability is also a key issue. The concept involves not only being able to transfer files between various systems, but actually to move the entire operating system to different hardware. This ability to move the human interface from machine to machine means that users will not need to relearn the operation of a new computer when they switch to a system with a different microprocessor architecture. If a computer's basic I/O system (Bios) is designed as a software module to the operating system, portability can be achieved by substituting a new Bios module containing all machine-dependent functions.

No operating system should have to deal with arbitrarily small bounds.

The concept of a software bus with various plug-in modules is also important in considering reliability. For reliability to be achieved in large software systems, each component of the system must, in turn, be reliable. Maintenance of a series of sovereign modules is far easier than tackling an entire system as a whole. Security, transaction logging, backup and restore facilities are also important characteristics of a reliable system. The operating system should also be able to degrade and recover gracefully as it is stressed and unstressed.

As micros become more powerful, the question of capacity gains importance. Advancements in random-access memory (RAM) and disk technology have made it imperative that RAM capacities in the future be measured in gigabytes, with disks designated for terabytes. No operating system should have to deal with arbitrarily small boundaries, such as 64K bytes. These capacities will also encourage performance features such as utilization of RAM disk to gain processing speed.

Actual operating system performance is the final important consideration. Performance is actually one of the keys to achieving successful rapport. Despite the time savings micros afford, people still expect the machine to react instantaneously. An operating system must be efficient for large addressing spaces and have optimized compilers to generate fast native code. The ability to produce efficient assembly code must also be available to the programmer.

With this wish list of operating system features and definitions, it is interesting to evaluate products available today. Unfortunately, most receive poor marks.

MS-DOS performs well but falls behind miserably in rapport; the P-system has good rapport and excellent portability, but suffers tragically in performance; and AT&T's Unix possesses great capacity but little else.

Clearly, a major breakthrough in operating systems has yet to emerge. The Smalltalk project from Xerox Research Center offered great promise, and some of that work is now displayed on Apple Computer, Inc.'s Macintosh (not enough yet to be classified as a usable operating system). Mosys, a new operating system based on Modula-2, is currently being released in Europe. It appears to make great advances in portability, flexibility and especially human rapport, lacking only a good communications function.

While it still is too early to assess accurately the impact of the Smalltalk and Mosys developments, they do offer encouraging signs that the immense marketing pressure exerted from such established systems as MS-DOS and Unix will not completely close the door to technological breakthroughs. Clearly, the hardware to fulfill this wish list is already in production. It now will take only some courage and imagination to make these "dream" operating systems a reality.

Rod Coleman is president of Stride Micro, formerly Sage Computer Technology, Inc., based in Reno, Nev. His firm manufactures and markets supermicrocomputer systems based on the Motorola, Inc. 68000.

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a major role simply because that is the machine that supports the corporate data base — that central repository of the "soul" of the company. The deployment of micros across an organization, however, changes the way the corporate data base can be used. With micros comes the immediate demand for the ability to move data from the mainframe to the micro and from the micro to the mainframe. The ability to transport data is further complicated by the eventual need to move data from one micro to another.

Another reason for moving data from micro to mainframe may not involve the corporate data base at all — it may be a function of using the most cost-effective storage technology.

In most organizations, there will not be a single solution to the micro-to-mainframe problem. The solution will be partly determined by the intended use of the micro-to-mainframe link, the communications standard(s) used, the composite use of the micros and the sophistication of end users. Clearly, with these different objectives in mind, *the* solution will probably be a compromise among contending interests within the organization.

Another way of confronting the micro-to-mainframe link is to address the corporate problems involved in the deployment of micros. Even while applauding that deployment we must recognize that just as micros can contribute to clearing up many bottlenecks, they can also cause others.

The appropriate use of micros can improve white-collar productivity, limit the growth in demand for clerical employees and provide the tools for producing better information for better decisions. The demand for a reasonable micro-to-mainframe link can also lead to decreased security for corporate data, require more sophisticated communications between micro and mainframe and necessitate the establishment of an extensive support structure for education, maintenance and systems development for micros. Having hundreds or thousands of micros in an organization is very much different from having two or three.

Problem: transactions with the corporate data base. The issue here is simply making the micro function as a terminal. Today there are more than 150 terminal emulation programs or combinations of software and hardware on the market and more coming. A terminal emulation program makes the micro act as if it were some "standard" or popular terminal. Two very important terminal emulations are those that make the micro act like Digital Equipment Corp.'a VT100 family of asynchronous terminals and those that make the micro act like one of IBM'a family of 3270-type synchronous terminals. In order to have adequate response time for transactional processing, 9,600 bits per second is the minimum communications speed we would wish to use.

Especially if we have a mixed-vendor or mixed-protocol computing environment — a single user having to access both IBM or plug-compatible machines and asynchronous minis, for example — then one solution is to use an asynchronous terminal emulator and a protocol converter on the IBM or plug-compatible mainframe to make the asynchronous "terminal" act like a 3270. For the Intel Corp. 8088-based micros (such as the Texas Instruments, Inc. Professional Computer, the DEC Rainbow or the IBM Personal Computer) there are a number of VT100 emulators available (the Rainbow comes with one built in, of course).

At the IBM and plug-compatible mainframe end, a protocol converter is plugged into the communications processor or is channel-attached. The protocol converter appears to the mainframe as a 3274 terminal controller. Every protocol converter seen so far supports numerous terminals, but always a VT100. The cost per micro of this solution — including a port on a protocol converter — is about $720.

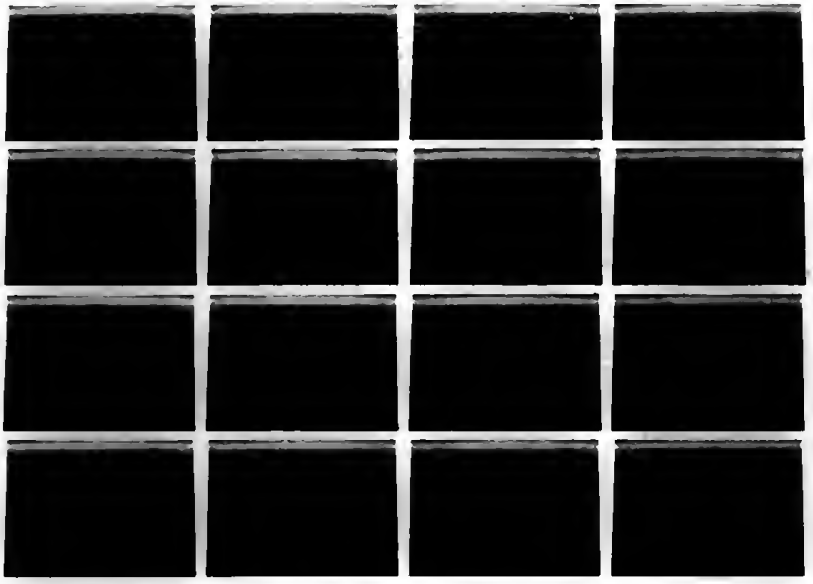
A second approach is to emulate some variety of 3270 directly on the micro. This method, even using the same line speed, frequently produces better response time, since the overhead of protocol conversion takes place at the micro rather than at some remote point.

In one sense, the least expensive way to go is to buy a software package (for between about $200 and $900, depending on the micro) that emulates a combination display station and controller (such as an IBM 3275 or 3276). Communications is via a synchronous RS-232 connection with the communications processor at the mainframe.

The disadvantage of this approach is that one micro workstation will take one synchronous port that otherwise could support up to 32 display stations working through a terminal controller. Some operating system software may have limitations on the number of synchronous lines that may be supported, or the cost of additional synchronous lines on the communications processor may not be warranted.

The alternative 3270 solution is a combination of software and hardware in an add-on board that contains the necessary circuitry for making the micro communicate with a terminal controller (a 3274, for example) via coaxial cable and software to drive the hardware. IBM's 3270-PC takes this approach to its maximum extent; the hardware is integrated into the design of the Personal Computer.

In this configuration, the micro appears to the user almost exactly like a 3270-type terminal and with equivalent speed. The disadvantage is the cost: about $1,200, including the port on the terminal controller and the Personal Computer hardware



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and software — not much different from a 3270-type terminal. The advantage: This solution precludes the necessity of putting both a micro and a 3270 terminal on a user's desk.

An interesting modification of the 3270 approach can be found in IBM's recent announcement of a broadband Personal Computer (local-area) Network developed by Sytek, Inc. of Mountain View, Calif. One product available for the PC Network is a 3270 emulator program that turns one Personal Computer into a communications server emulating a 3274 (Model C51) terminal controller and a 3278 or 3279 display station. Up to 32 of the Personal Computers on the network can operate through the server concurrently, acting as individual 3270 display stations to the mainframe. IBM's announcement may end up preempting other new or planned products of a (logically) similar nature, but the concept of interfacing a microcomputer-based local-area network to the mainframe system is important.

Downloading from the mainframe to the micro is at once easy to implement and difficult to implement effectively.

Problem: moving quantities of data. After receiving a micro, a new user frequently wants to download data from the corporate data base on the mainframe to the micro for further analysis or inclusion in reports. Less apparent is the need to upload data captured or massaged on the micro to the mainframe for further analysis with mainframe tools. A growing need for uploading is in using the mainframe as a storage medium for the micro. Micro users also quickly realize the need to move output from the micro to the mainframe so that they can use specialized mainframe peripherals, such as laser printers. We can solve each of these problems in somewhat different ways.

Some mainframe software must interact with micro software. That interaction may not be very sophisticated, but it must take place. Downloading from the mainframe to the micro is at once easy to implement and difficult to implement effectively. If the data to be transferred consists of only printable characters in a sequential file, the only thing necessary on the mainframe end is some listing utility that allows the listing of the data to the terminal. On the micro end, the terminal emulator must only be smart enough to allow capture of the data in a file or memory. If the communications lines are not very clean, some error-checking protocol is desirable.

Many asynchronous terminal emulators allow such file transfer. If the emulator is smart enough, a simple mainframe program may be written that prompts the user for a file name then takes control over the micro to perform the transfer, thus making the downloading more automatic. This process requires a terminal emulator that can be remotely controlled.

In the micro-to-mini environment, the foregoing approach is often used. In a 3270-oriented, data base environment, however, the problem becomes more complex. The first problem is that the software at the mainframe end will be more complicated because files are rarely in simple sequential format. Furthermore, data is often accessed via a data dictionary, which requires intervention of a more sophisticated data retrieval program to obtain information. The block-oriented nature of synchronous communications can also complicate the mainframe software.

Assuming that all these problems have been overcome, then the micro software must also be smart enough to respond appropriately. Many of the manufacturers of 3270 hardware/software emulators are attempting to confront this problem, but it is complicated by the use of a variety of teleprocessing monitors and data base systems. The same technique cannot be used for IBM's CICS and IMS, much less for systems like Software AG's Complete and Adabas. Solutions for this problem will probably come from several sources, including the mainframe software manufacturers as well as the micro peripheral manufacturers.

A different approach to this problem is the use of a software system on the micro that turns the micro into an IBM 3780 or Hasp workstation remote job entry (RJE) terminal. An advantage of this approach is that virtually all IBM systems have the appropriate mainframe software as a more-or-less standard feature. A further advantage is that if appropriate IBM mainframe software is implemented, routing can take place to many other mainframe peripherals.

A major disadvantage is that an RJE line must be specified in the system generation on the mainframe, and it may not be accessible by more than one remote device. The micro acting as an RJE terminal will also take up a synchronous port on the mainframe's communications processor. Where it is appropriate, however, this file transfer technique can be very useful for both uploading and downloading.

A more interesting and exciting class of software just now coming on the market consists of systems that allow the micro to use the mainframe as a peripheral. In a large organization, this software could prove to be extremely useful for archiving documents and data originating on micros, since the mainframe disk drives are always backed up, usually on a daily basis, and security is normally much better. One of the earliest products of this type was Tempus-Link from Micro Tempus, Inc. of Montreal. A product expected to be released in late January is Rdisk from Tangram Systems Corp. of Raleigh, N.C. There may be others on the market or under development. These systems provide both micro and mainframe software with the result that a communications link is established, allowing micro users to think of the mainframe simply as another (although very large) disk or diskette on the micro, accessed in apparently the same way the micro's operating system accesses a local disk.

The speed of these products is dependent on the communications line speed and the method used by the designer to access communications on the mainframe. On the IBM or plug-compatible mainframe end, Tempus-Link uses standard teleprocessing systems, such as CICS or TSO, to take care of communications (a relatively limited technique), while Rdisk will probably use direct access to IBM's Virtual Telecommunications Access Method, which will result in a more flexible and possibly faster system. These products may optionally provide access to data base systems such as IMS or Adabas, as well as the capacity to transfer files from the virtual micro disk for access by other mainframe software. Although such products will probably operate best in a synchronous environment, they will typically allow either synchronous or asynchronous communications.

The two broad needs in the area of micro-to-mainframe links are for transaction processing on the one hand and for sizable data transfers on the other. If organizational policy demands that even when the user is doing micro applications, his work should appear to be in the context of mainframe software, then one set of solutions is appropriate. If, by way of contrast, the objective is to make the system appear to be an extension of the micros' operating environment, then another set of solutions is necessary. There is clearly a variety of products on the market that will provide various resources and facilities, and more are on the way.

Tom Madron is manager of computer services at North Texas State University, Denton, Texas.

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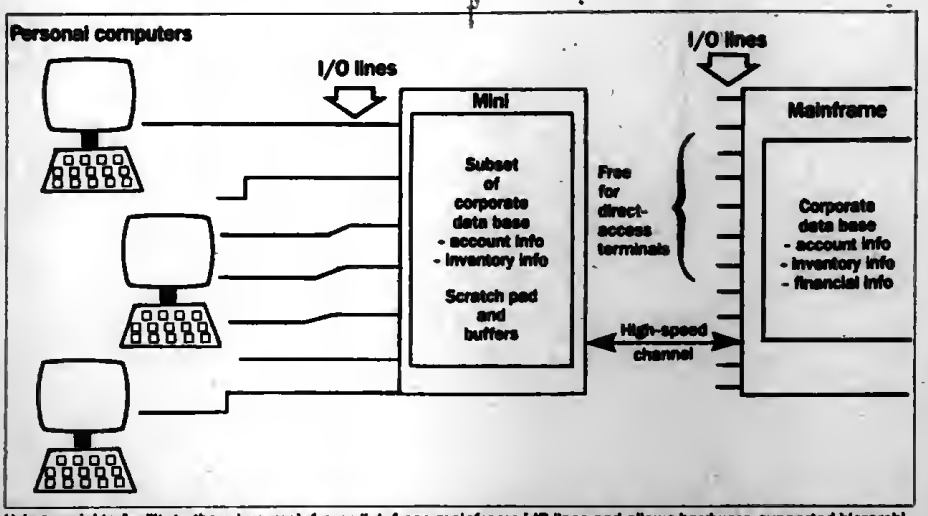
Overall system maintenance costs may actually be reduced with the go-between mini, especially in terms of user-experienced downtime.



Using a mini to facilitate the micro-mainframe link frees mainframe I/O lines and allows hardware-supported hierarchical access to the corporate data base.

(Continued from Page 29)
variable to an already complex problem. But this approach actually can reduce overall system cost, maintenance and complexity.

Personal computers typically entered corporate computing environments in an ad hoc way; individual employees selected the micro best suited to their particular needs. Often this freedom led to a proliferation of different types of boxes, all clamoring to access the corporate data base for as many purposes as there were micros. The DP manager had to adapt to the new, largely unanticipated needs of his users. Problems appeared in at least six areas:

1. Mainframe contention and performance.
2. Control of system access.
3. System maintenance.
4. Security and integrity of data.
5. Costs added by the introduction of micros into the system.
6. Overall system complexity.

The introduction of a mini between the mainframe and the company's micros preserves the performance of the corporate mainframe. Many of the software and network peripheral solutions to the problem impose a burden on the mainframe in terms of disk access, allocation of I/O and communications channels and even CPU time. By having the micros connect to the mini instead of directly to the mainframe, channel contention and allocation are drastically reduced. Disk access, demands of mainframe CPU attention and I/O traffic to and from the mainframe can be regulated and "bursted."

In most cases, personal computers use the corporate data base in a read-only fashion, accessing records from the disk and downloading them for use with the micros. In these environments, an image of the data base (or the most popular parts of the data base) can be downloaded to the mini for micro access, obviating the need for micros to access the mainframe at all. The mini can act as a large, intelligent cache, overlaying less popular segments of the data base with those more in demand.

For records that can be altered, the mini can do presorting, prequalification and other preprocessing, further unburdening the mainframe. The mini also adds to the system several new ports, while only using one mainframe port for its connection. Mainframe ports and channels are freed for use by terminals that must interact directly with the mainframe (see figure).

The mini can also act as watchman or gatekeeper for access to mainframe resources. Instead of trying to control access directly on the mainframe, using complex software devices that chew up CPU time, these control devices can be located on the mini. The data base can be controlled by only allowing micro access to it on the mini and only allowing certain parts to reside (in image) on the mini. The frequency, length and type of accesses the micro makes to the mainframe will be only those allowed between mini and mainframe, and these can be far more easily controlled using the mini.

Finally, control of data integrity and quality can be much better handled with the intervening mini. No valuable mainframe primary memory or disk space will be used for scratchpad or buffer space. The preprocessing of records on the mini can also serve to quality-check the data before it gets merged into the corporate data base.

Unlike the most popular mainframes, the most popular minis and micros support the closest thing we have to a standard system software base, the Unix operating system. Unix works to smooth over hardware differences between the various types of micros and minis by providing a known, common interface to programs.

Unix allows several different micros to communicate and cooperate in a standard way to other Unix systems. Since it is more likely that the mini rather than the mainframe will support Unix, the mini becomes a key in providing more standardization and better control.

Unix allows programs written on micros to be recompiled to run on the Unix-based mini, and vice-versa. This portability encourages people to use one common set of programs and procedures for any specific application, and the software development process becomes more manageable.

Adding a mini to a situation in which one wants to control micros and mainframes may appear to add complexity to an already complex environment, at the least because it adds another system to be maintained. Overall system maintenance costs may actually be reduced with the go-between mini, especially in terms of user-experienced downtime and its associated costs.

First, many minis today, especially those using very large-scale integration (VLSI) microprocessors, do not need a special environment. No special provisions need be made for a raised floor or air-conditioning, and the mini can be placed close to micro users.

Second, many minis today are becoming fault-tolerant, or high-availability, machines. It therefore becomes unlikely that the mainframe and mini will be down at the same time. The mainframe, which is much more sensitive to maintenance needs, can be brought down for maintenance without closing out all micro users. Their activity with the corporate data base takes place on the mini, which is resistant to crashes and, in many newer architectures, can be maintained and repaired while still up and running with online users. The data base activity can be batched on the mini and bursted to the mainframe when it comes back up.

With respect to security, having the mini as a gatekeeper can allow control of access to the corporate data base and the integrity of the data merged with it. Security often amounts to what in the data bases is accessed when and by whom. These questions can be answered by the way in which micros are configured to the mini and how the mini accesses the mainframe.

There are perhaps many cheaper ways to effect the link, but when the added performance, features and flexibility are taken into consideration, the mini solution is probably the most comprehensive and best in terms of price/performance. Mini-mainframe software links are more stable than their micro-mainframe counterparts. It is as easy to install micro-to-mini software links as it is micro-mainframe links and just about as expensive; but with the intervening mini, much more is gained.

The combined benefits of Unix, fault tolerance, off-loading the mainframe and preprocessing and prequalifying data produce savings in costs related to software development and porting, system downtime, data integrity and mainframe productivity. If a comprehensive accounting were done, it would not be surprising to find that such savings offset the cost of installing a mini.

Gavin Villapiano is a marketing consultant based in Little Silver, N.J. He has been director of marketing programs at Auragen Systems Corp. and marketing/sales manager at Intermetrics, Inc.

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PORTABLES FOR THE MOBILE

The inherent limits of portables now prevail over their advantages.

By Hal Glatzer

The closer a portable's performance is to a desktop personal computer's, the broader its distribution will be through conventional channels. That's one reason people aren't yet buying many portables, according to Charles Satuloff, president of Teleram Communications Corp. They are waiting to see what's coming.

Truly portable computers — weighing only a few pounds and driven by batteries — have not yet reached that level of performance, and sales are languishing. Manufacturers and advertisers are targeting

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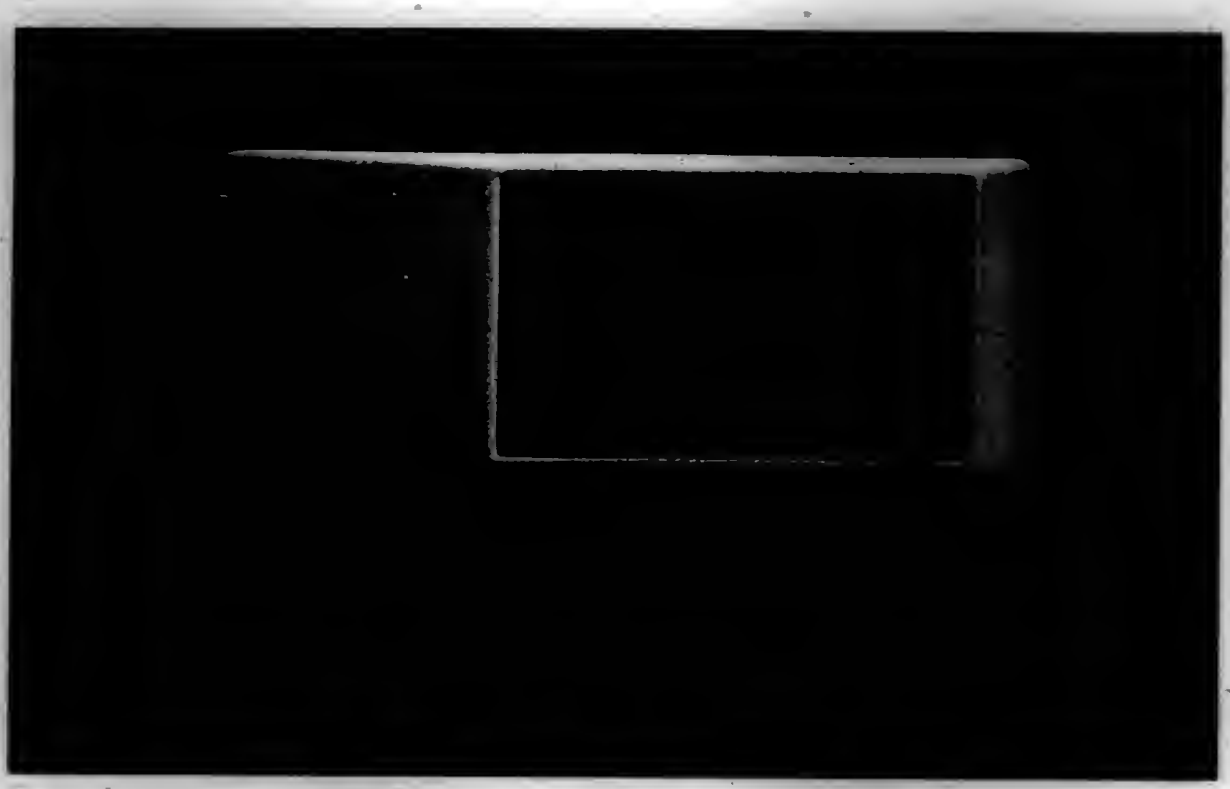

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mobile professionals who work away from their offices. Those people seem to want special-purpose software for standardized tasks, such as auditing or sales. They will be first-time buyers, but they want full portability without giving up functions. Price and software compatibility with other systems are secondary to them.

However, the current buyers of portables — the ones who have driven the market so far — are less mobile in their professional lives and more generalized in their needs and wants. They are also more sophisticated users for whom a portable is their second computer. They want portables that run familiar software packages for word processing and spreadsheet functions and whose files and operations are compatible with the desktop software they already use and understand.

The battle for the market today isn't between portables and desktops, but among the portables themselves. There are three sizes: suitcase, notebook and briefcase.

Suitcase systems weigh between 20 and 30 pounds. Such a portable ("transportable" or "luggable" might be a better word for it) is really a desktop computer that has been squeezed into a tight box, yet is every bit as powerful. It has a 9-in. CRT screen and at least one 5¼-in. disk drive through which it can load off-the-shelf software. The Osborne Computer Corp. system was the first successful portable, but since its decline, Kaypro Corp. (for the Digital Research, Inc. CP/M market) and Compaq Computer Corp. (running Microsoft Corp.'s MS-DOS) have been the leaders.

Most of the IBM Personal Computer clone makers offer a Compaq clone, too. Suitcase computers are portable offices that can be set up wherever there is an electric outlet. They are priced between about $1,500 and $2,500 (an optional hard disk doubles the price) and are popular with people who can afford to buy only one system.

Micro lightweights

Notebook computers are the ultralight aircraft of the computer world. Battery-powered machines like the Tandy Corp. Radio Shack Model 100 or the NEC Information Systems 8200 weigh only four pounds and are no larger than a looseleaf notebook, though they have full-size typewriter keyboards. Through a liquid crystal display (LCD), they present eight lines of 40 characters each. They can't run the same software as desktop computers do, but instead have built-in software on a read-only memory (ROM) chip.

Though limited in power and memory capacity, they can do serious work; journalists have adopted them as substitutes for portable typewriters and can send stories to their editors over telephone lines. Starting at only about $600, these systems are an inexpensive way to take work on the road — as long as the buyers keep their performance expectations within reason.

Briefcase computers are a second generation of portables after the notebooks. Weighing about eight to 12 pounds, they are more powerful than the notebooks in three important ways: They hold more memory (at least 128K of random-access memory [RAM]), they can display more text on their screens (16 lines of 80 characters each) and they come with programs (in ROM) that are almost identical to the most popular disk-based programs for desktop and suitcase computers.

The briefcase and notebook computer industry is waiting for IBM to introduce a product that will "legitimize" the market.

Versions of Lotus Development Corp.'s 1-2-3, Micropro International Corp.'s Wordstar and Sorcim Corp.'s Superwriter come on Hewlett-Packard Co.'s 110, Epson America, Inc.'s Geneva and Sharp Electronics Corp.'s PC-5000, respectively. Those machines cost between $2,000 and $3,000.

The Data General Corp. portable, the DG/One, is operationally compatible with the IBM Personal Computer and runs applications such as Wordstar, Lotus's Symphony and Ashton-Tate's Dbase II. The 9-lb unit features a flat liquid crystal display that provides a 25-line, 80-column screen.

Because many users want complete portability, battery power is required for notebook and briefcase systems. But the most expensive briefcase portable, from Grid Systems Corp., needs AC to power its electroluminescent screen, bubble memory chips and 1,200 bit/sec modem. So, of course, Grid's vice-president for marketing, Alan Leftof, challenges the assumption that portables need batteries. "If you're an auditor and your client doesn't have an AC outlet in his office, you don't want to audit him anyway!" he says with a smile. But Grid has developed a 3-lb, lead-acid battery pack, he notes, "in case customers ask for it."

The briefcase and notebook computer industry is, right now, in the same position the microcomputer industry was three years ago — wait-

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ing for IBM to introduce a product that will "legitimize" the market. (IBM's suitcase computer competes against Compaq in the market that Compaq developed.)

Tom O'Brien opened a store in Rochester, N.Y., that sells only portables. But he has noticed a fundamental problem that new users must overcome. "People who are out of the office are on their own. In the office, there's always someone to help you use the computer to get over a hurdle. Outside people need machines that make it clear how to use them — so the seller doesn't have to." He likes HP's Help screens for 1-2-3. "Making the computer do what you want shouldn't get in the way of closing the sale," O'Brien says. "The user has to be able to do what he wants to do in a natural and intuitive way."

Today's market is horizontal, with word processing and spreadsheets for everyone. But the next big wave of sales will come from vertical and niche markets. The automotive, publishing, government, legal and insurance sectors are ready to automate their traveling personnel. Niches within those industries include field sales, technical service and auditing.

The automotive, publishing, government, legal and insurance sectors are ready to automate their traveling personnel.

"The office is automated, the factory is automated; the field personnel are next," says Teleram's Satuloff. "But the cost to automate them is high. They travel a lot, and their salaries are expensive. There will be an explosion of portable workstations — faster than prognosticators expect — but only with corporate sponsorship or when smaller companies can improve their payback time."

Compaq and the other suitcase computers are selling well, but people have not flocked to buy notebook and briefcase portables. Sales have been disappointing.

According to Bert Sperling, president of Dataccount, an OEM software house, "Radio Shack has sold only half of the 350,000 Model 100s for which it contracted with Kyocera [the manufacturer]. Convergent Technologies, Inc.'s Workslate is dead and gone because spreadsheets were not the answer to the world's problems. Xerox Corp. shut down its 1810 operation. And I can't talk about sales of the Micro Office or the Teleram, because I don't know if they've had any yet."

Reliable sales figures are elusive. Egil Juliussen of Future Computing, Inc. admits he can't track the sales of many portables because so many are available through mail-order houses or are acquired in government purchases, neither of which are included in his surveys.

Businessland, Inc.'s product manager, Paul Schumann, says flatly: "For a primary computer, trade-offs are not acceptable. Portability does not make up for a small display, higher price or lack of disk. Portability is a feature — not a class of machine or reason for buying. But it makes a secondary computer acceptable, especially if it carries a discount from the desktop's price. After all, for $3,000, a person could buy another desktop computer. Portability shouldn't be expensive. Users set their minimum requirements for power and features, and the trade-offs they have to make for the current wave of portables are below the thresholds those users have set. That's why sales have been disappointing."

The problem seems to lie in the nature of portables themselves; so far, their inherent limitations are prevailing over their advantages. It hasn't happened yet, but briefcase computers are probably going to dominate the marketplace for portables after 1986. Increased demand is driving down the price of 25-by-80, flat-panel LCDs. There is a down-sizing of desktop machines, through innovative packaging, denser memory chips and new manufacturing techniques, such as surface-mounting of components on both sides of a printed circuit board.

A corresponding upscaling of features on notebook portables is bringing in 3½-in. disk drives and squeezing software more economically onto ROMs and programmable read-only memory in smaller quantities (for example, Microsoft Corp. is releasing Multiplan in ROM for the Model 100).

So, the two trends will probably meet in the middle. In the words of Visual Computer, Inc.'s marketing director, Bill Machanic, "The hybrid will be a desktop in a portable package that may never be moved."

John Banning, vice-president of software development at the now-defunct Gavilan, agrees. "A portable may be thought of the way a telephone is: Its value isn't in its portability but in its connection to a network." They may be powerful, he says, "but in terms of features, the portable computer will always be a generation behind the desktops."

Hal Glatzer is the author of five books on computers and communications. Based in Seattle, Wash., he contributes to anthologies, magazines and trade journals.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CONCURRENCY — DOING MORE THAN ONE JOB AT A TIME

By Hal Steger

In August, IBM announced Topview, a multitasking applications environment for IBM Personal Computers. IBM claimed Topview could increase productivity by:

1. Providing user control of the work flow so that interruptions are easier.
2. Reducing program start and stop time and media handling.
3. Overlapping program execution time to get more total throughput when running multiple applications.

With this announcement, attention now focuses on how concurrency (the ability to have several programs working at the same time) can apply to personal computers.

It is important to understand the distinction between several programs running at the same time and several actively working at the same time. Some products on the market allow the user to load multiple programs at once, yet only one can be active at a time. Other products, such as Digital Research, Inc.'s Concurrent PC DOS, allow several programs to be actively working at the same time. A personal computer running Concurrent PC DOS could receive

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electronic mail, sort a data base, print a report and compile a program, all at the same time.

There are two main benefits of personal computer concurrency: increased personal productivity and low-cost solutions for the computing needs of a department or small office.

Increased personal productivity

What do these tasks have in common?

- Printing a report or plotting a graph.
- Sorting a file or generating a report.
- Compiling a computer program.
- Executing a long program or lengthy calculation.
- Checking a document for spelling errors.
- Receiving or sending files over the phone; talking to a mainframe.
- Backing up a hard disk.

These tasks require anywhere from a few minutes to several hours and do not need human intervention. They are usually performed one at a time on personal computers. The result is that the user waits to use the system while the tasks are running.

Concurrency allows the user to perform such tasks and still use the system for other work. Consider the financial analyst who spends 30 minutes a day receiving stock information from Dow Jones, updates his clients' portfolios, performs stock analyses and writes letters to his clients. With concurrency, the analyst could do everything at once. The result is that he has time to handle more clients or conduct more research. He increases his personal productivity.

Switching from one application to another is a much more natural, convenient way to work that leads to increased productivity.

Concurrency also increases productivity by allowing for smoother handling of work flow interruptions. Many executives use several software applications such as Lotus Development Corp.'s 1-2-3, Micropro International Corp.'s Wordstar and Software Publishing, Inc.'s PFS:File during the course of a day. As the person uses his computer, he is constantly interrupted by phone calls, visitors and messages. And as the person works, he needs to reference information contained in different programs. Without concurrency, the executive would have to save the files, exit an application and start a second application. With concurrent processing, he can run his most commonly used applications at the same time so that he can switch easily from one application to another. This switching from one application to another is a much more natural, convenient way to work that leads to increased productivity.

Low-cost, multiuser solutions

There are several obvious considerations when providing computers for a group of people. How much will each person need and use a system? How much information must be shared? What is the optimum way for people to share expensive peripherals like letter-quality printers and hard disk drives?

Depending on needs, the hardware/software solutions range from expensive personal computer networks to inexpensive time-sharing systems.

Personal computer concurrency leads to a low-cost solution to the computing needs of a department or small office. Consider an office with a manager, a secretary and a salesman. The secretary might need to use a computer all day for word processing; the manager will use the computer several times a day for project management and financial analysis; and the salesman might want to phone in orders or check inventory levels.

One solution is for each person to buy his own computer and for the group to network them together. A cheaper solution would be for the office to buy just one personal computer and give everyone a terminal. Concurrency allows this arrangement, combining the best of the microcomputer and minicomputer worlds. People can run the same software and get the same response time that has made personal computers so popular; yet they can share information and expensive peripherals in a way that has made minicomputers successful.

Concurrency holds several implications for Fortune 2000 companies and software developers. It is ideal for personal computer communications: Users can perform electronic mail, networking or micro-mainframe communications in the background and still use their personal computer for other work. Further, computerizing a department with a personal computer and several terminals is a low-risk way to learn about and implement multiuser systems. Several people can access the same applications and data simultaneously at little incremental cost over the price of a personal computer.

Fortune 2000 companies should also be aware, when evaluating and purchasing software, whether the software supports concurrent processing.

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Developers will want to take advantage of safeguards such as record and file locking to ensure smooth operation in a concurrent environment.

productivity gains by developing software in a concurrent environment. It is possible for a programmer to compile a program, debug a program, print a listing and test a program, all at the same time.

As concurrency gains acceptance, a new class of applications will sell. We are beginning to see electronic mail packages that allow users to work on several tasks simultaneously. At the same time, developers should become aware that their products will be used in a concurrent, and perhaps multiuser, environment. One decision software developers face is whether to write software for specific hardware or write software that is "well-behaved" and written to the operating system.

The old trade-off was that software written for specific hardware performs much faster, yet cannot easily be rewritten to run on different computers. A new consideration is that applications must be written to the operating system to work in a concurrent environment.

As concurrency creates a market for itself, developers might choose to develop well-behaved applications to give their products a competitive advantage in this area. It also means that developers will want to consider taking advantage of safeguards, such as record and file locking, to ensure smooth operation in a concurrent environment.

Limitations and costs

There are three main limitations of personal computer concurrency. First, personal computers that support concurrency require greater hardware investments in memory and fixed-disk drives than computers that run only one program at a time. Both Topview and Concurrent PC-DOS, for example, recommend a computer configuration with 512K bytes of memory and a hard disk. These figures compare with 256K of memory and two floppy drives for a single-tasking computer.

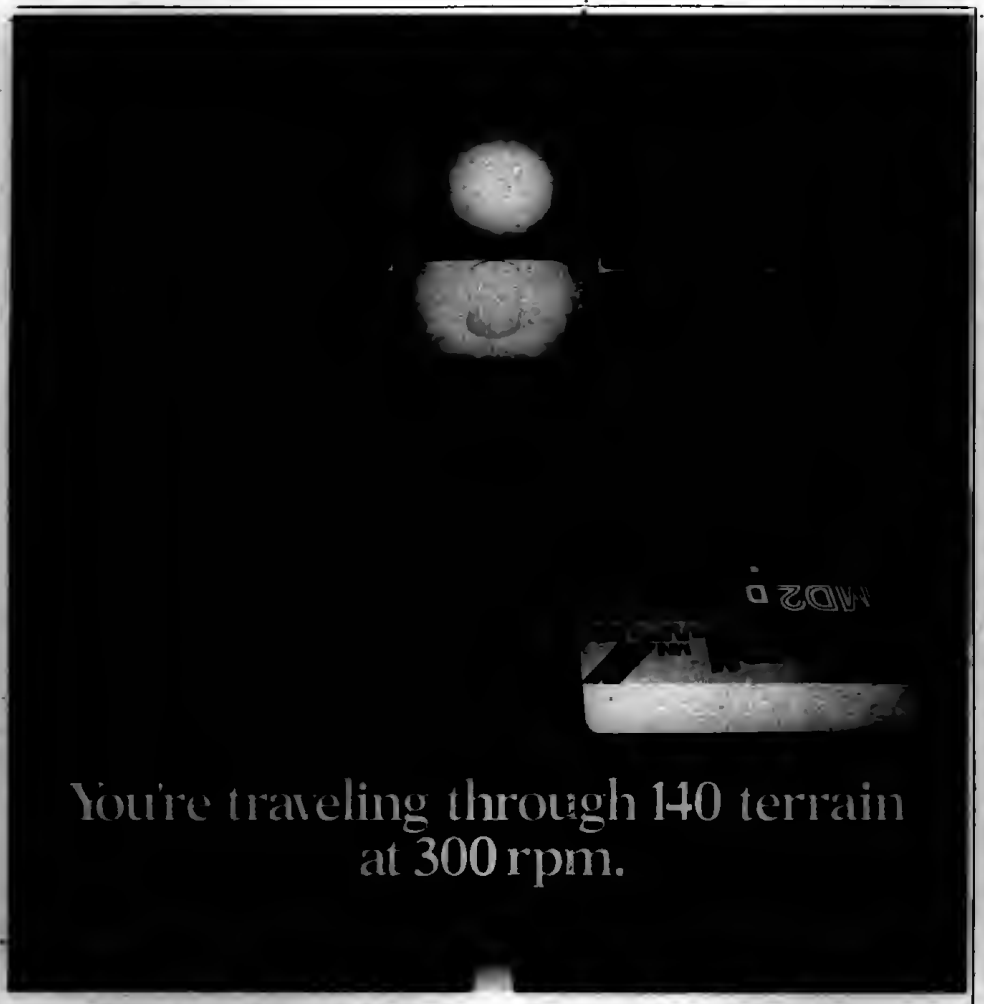
Second, concurrency produces more processing overhead than the single-tasking counterparts, which makes running some applications in a concurrent environment impossible or less desirable. If a person performed only word processing all day, he would, of course, receive no benefit from concurrency. In addition, as concurrency supports several tasks simultaneously, system resources must be shared among tasks. Tasks that require dedicated resources, such as process control applications, are not well-suited for a concurrent environment.

Third, there is an extra cost involved in supporting concurrency because concurrent processing is more complex than running one application at a time. When more than one program is run at a time, a new class of problems can develop, because of the way programs interact and share aystem resources.

A class of concurrency-based software applications will emerge for the office. The first applications will focus on satisfying communications needs such as electronic mail. The next generation will be productivity-tool-oriented.

As personal computers increase in power yet decrease in cost, the hardware will support concurrency with better system performance and response time. As white-collar professionals strive for increased personal productivity, they will adopt concurrent computing tools.

Hal Steger is product manager for retail operating systems at Digital Research in Pacific Grove, Calif.



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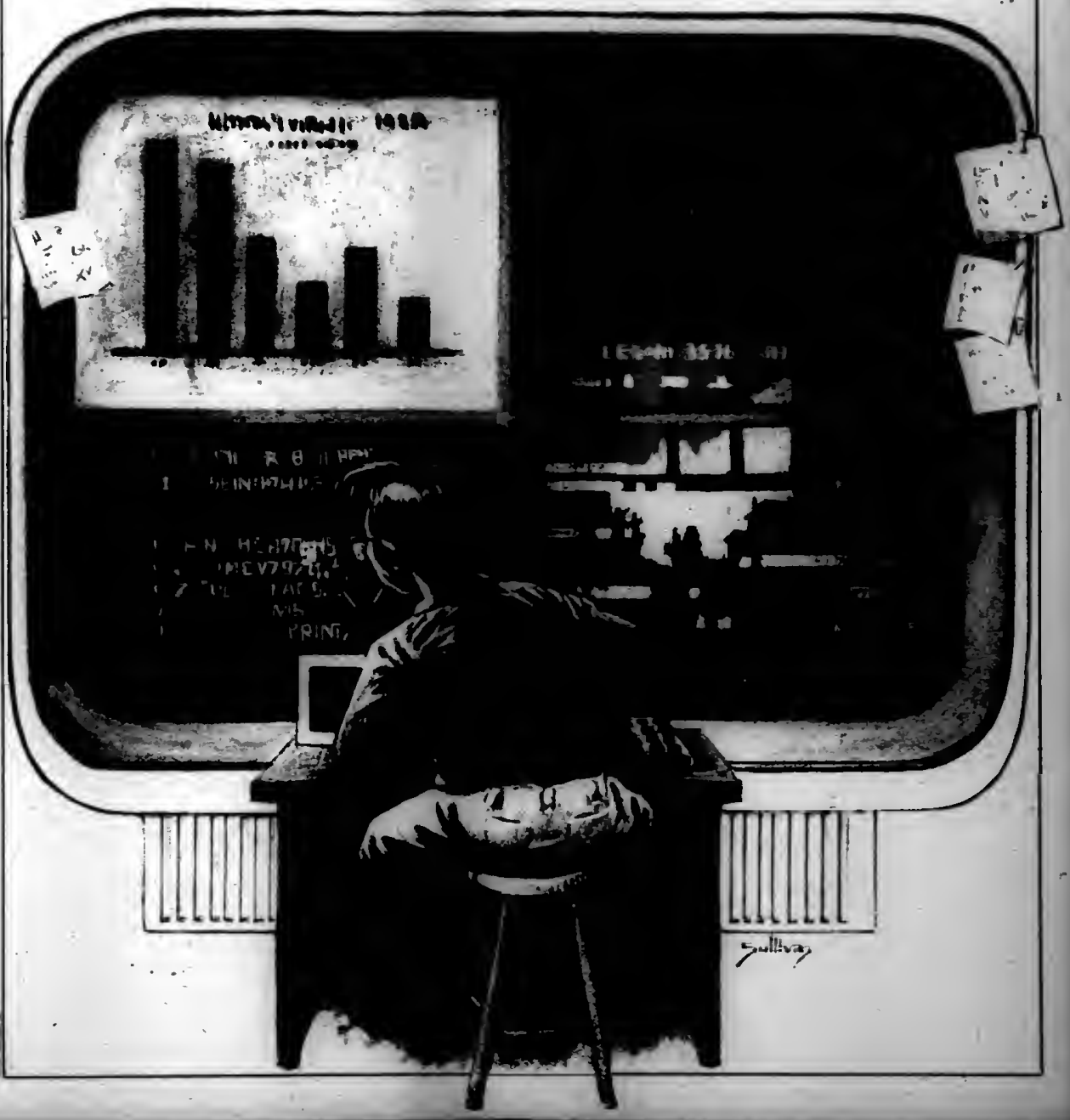
THE UNIVERSAL WORKSTATION

By Kenneth Sullivan

Many of today's stand-alone professional computers could turn out to be white elephants as corporations realize that micros that function in both stand-alone and networked modes are the better investment.

Information is most useful when it can be shared, compared and communicated to other people within an organization both locally and remotely. By choosing the right professional computer, corporations can both protect their investment and plan their office information processing requirements wisely.

The "right" professional computer addresses not only the personal productivity needs of the individual user but also the growing corporate need for truly integrated



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systems and specialized communications networks and services, including data and word processing, image and audio processing and multiple business application software solutions. It is, in short, the multifunction workstation — a system that meets the broad needs of personal computing and office information processing with one desktop machine.

Professional computers function effectively as multifunction workstations in the business environment if they meet the following six major requirements:

- Stand-alone applications, including the wide range of IBM Personal Computer software.
- Host workstation applications.
- Communications flexibility, including terminal emulation and local-area networks.
- Participation in multivendor environments.
- Integration of office information processing tools.
- A growth path to new imaging, voice and multiuser technologies.

Stand-alone applications

Multifunction workstations should be able to run the variety of available stand-alone applications that meet multiple business needs, such as word processing, spreadsheet, data base and business graphics. Users today also want access to software packages and systems that solve problems specific to their industry.

In addition, the thousands of software packages on the market today written for the IBM Personal Computer make some degree of Personal Computer compatibility a major requirement in selecting a multifunction workstation.

The major difference between a professional and a personal computer lies in the availability of professional-quality software. While many of the stand-alone applications today run on both professional and personal computers, it is the user-friendliness of the more sophisticated, advanced packages that entices professionals to use them for individual processing tasks. In this context, professional quality is defined by how easy the software is to learn and use. It appears that menu-driven software, for example, will distinguish professional computer/multifunction workstation applications, as long as the procedure standardizes around a given menu approach.

Host workstations

Professionals solving today's complex business problems need information from many internal and external sources. They require access through professional computers to larger systems in the corporation, including departmental minicomputers and host mainframes. They need access to corporate data bases in order to capture segments of that data and format it into management reports; thus, the need for host-integrated workstation applications. A professional computer provides emulation capability for multiple host workstations.

A user in an accounts payable department, for example, might require access to accounts on a region-by-region basis. If the professional computer is a stand-alone system, the information must be obtained by phoning or visiting the appropriate personnel, resulting in time and productivity delays.

On the other hand, a professional computer in host workstation emulation mode can electronically access that information quickly and easily.

In addition to host workstation emulation, a tremendous amount of communications flexibility is required by the end user. Information of all forms (data, text, graphics, image, voice and integrated combinations of these five) should be electronically transferred among devices within a system, among systems within a local or remote network and among multivendor systems.

The better professional computers emulate not only system workstations manufactured by their own vendor, but also those manufactured by competitors. Some professional computers on the market today can emulate system workstations from as many as three or four competitive manufacturers.

Multifunction workstation professional computers should support a wide variety of local and remote communications options, including asynchronous, binary synchronous, IBM's Systems Network Architecture and

Now you can have a complete UNIX System III implementation on most models of the IBM PC.

The IBM Personal Computer Interactive Executive† (PC/IX) offers you tools like the C language, programmer's workbench, communication facilities, a text processing system and much more. It's also a multitasking system that offers you the same facilities found on larger UNIX operating systems.

And PC/IX incorporates many significant enhancements. For example, a new full-screen editor helps you program more effectively. It offers such advanced features as windowing, function-key editing, the ability to execute commands from the editor, and automatic file backup. Beginning users of the editor can rely on a variety of "help" screens.

If you've been using PC DOS, you'll be glad to hear that it can co-reside with PC/IX. And that you can transfer files between the two systems.

PC/IX is specifically designed to take full advantage of the architecture of the IBM PC.

It transparently supports the 8087 Math Co-Processor. And PC/IX automates the management of input/output streams through a multipurpose queuing and spooling system.

IBM has other software for PC/IX

teletypewriter emulation. When purchasing professional computers, a corporation should obtain a firm directional commitment from the manufacturer to a specific type of local professional computer or multifunction workstation network, whether it be baseband, broadband or twisted pair.

If a corporation wants to connect professional computers in a single department, a baseband network will suffice. However, if the requirement is to connect many departments' groups of professional computers, as well as facilitate additional corporate communications needs, a broadband topology will allow the required multiple communications concurrently on separate channels.

In addition, if a corporation is investigating PBXs (or twisted pair), its professional computer vendor should have a clear directional statement allowing groups of professional computers to exchange information where PBX networks are installed.

Users also need advanced file handling capabilities, such as the ability to convert automatically and transfer document files from one system format to another so they are usable at both ends. Filing and archiving functions allow common or private storage of files anywhere in the network. With file sharing, MS-DOS data files from the professional computers can be stored on a larger host and accessed by other professional computers.

Office information processing requires workstations that can participate in file management systems, allowing users a transparent means to distribute and retrieve documents on the network.

Multivendor setting

Few companies will rely solely on a single vendor for all of their office information processing needs. A workstation existing within a multivendor environment, therefore, should be able to do the following:

- Run programs using industry standard operating systems, such as Microsoft Corp.'s MS-DOS, IBM's PC-DOS, Digital Research, Inc.'s CP/M 86 and AT&T's Unix.
- Have program portability by using industry standard programming languages such as Basic, Cobol, Fortran, Pascal and C.
- Offer ease of text creation, editing and communications through standard document formats and communications protocols.

Multifunction workstations have to operate as part of the total corporate information processing solution, providing the user with concurrent access to a variety of tools.

Above and beyond the personal stand-alone processing functions, such as integrated word processing, spreadsheets and business graphics, multifunction workstations should handle information management tasks, such as electronic mail for delivering, receiving and responding to mail and phone messages, and time management tasks, such as a convenient notebook, "to do" lists and calendar function. It is extremely important that today's workstation integrate stand-alone, host workstation and communications tasks.

Products such as Microsoft's MS-Windows, Visicorp's Visi On and Digital Research's Concurrent DOS have brought the concepts of windowing and concurrent operation of multiple programs and access to multiple host data bases to the forefront of professional computer technology. Windows enable professional computer users to integrate different types of information quickly and easily from various sources. A word processing memo, for example, can incorporate facts and figures from a host data base, portions of a spreadsheet and a graph, with just a few keystrokes or the movement of a mouse.

Path to new technologies

A multifunction workstation must be fully hardware- and software-upgradable in order to protect the corporation's investment. A user should be able to buy a professional computer with just the amount of functionality necessary to do his job today, with the full assurance that as job requirements dictate greater functionality and as technology changes, his workstation can be easily upgraded.

Upgrading means adding functions, not replacing equipment.

New technologies such as voice, image and multiuser

PC IX

available, too, including INfort (a FORTRAN compiler with programming tools) and INmail/INnet/FTP (an electronic mail and file transfer facility)†.

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PC/IX requires 256KB of memory on an IBM PC with fixed disk or an IBM PC XT, PC XT/370 or PC AT.

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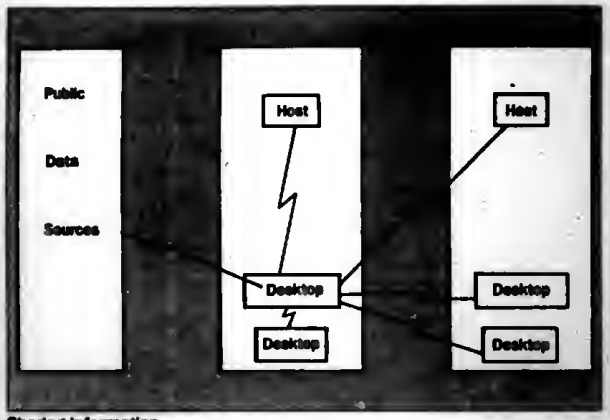
The industry is quickly moving to the time when a multifunction workstation will be plugged into the wall as part of an end-to-end, truly digital network.



Sharing information

and multitasking information processing environments are enhancing the personal computer industry today. A Wang Professional Computer, for example, can be upgraded to a Wang PIC image processing system that allows a high-resolution digitized image to be combined with text.

With image processing, images — whether they be handwritten notes, drawings, photographs or other forms of information — can be displayed, stored and edited as if they were text. They can be moved, copied, made larger or smaller, darker or lighter. The combined image-text document can then be printed by high-quality thermal or laser printers. They can be distributed as messages or mail and viewed on professional computers that do not have image scanners. As much as 90% of the paper input corporate professionals receive in their day-to-day operations is visual — forms, reports, graphs, proposals and so on — and was not amenable to computer automation until state-of-the-art image processing developed. Through PIC, users can also annotate this image-text document with digitized voice and then send the annotated document to one or more users.

Images captured at a professional computer-based workstation have to be treated as data and tied in with various local and host data base managers. Office communications have to be enhanced with the ability to record, store and forward voice messages on professional computer-based workstations.

Built for heavy use

In addition to the six requirements, multifunction workstation components must be designed for heavy use and systems reliability within the office environment. They should be workhorses, getting the job done quickly, efficiently and accurately.

No time should be wasted converting information, changing formats or deciphering data.

Multifunction workstations should possess outstanding CPU performance. Windows, concurrent tasks and unstructured data such as image and voice require a high-performance microprocessor design, such as the Intel Corp. 8086 or 80286 chip. They should also have a modular growth path, with options and add-ons provided by the workstation vendor.

The professional computer is the ultimate multifunction workstation. It provides transparent access to all types of information, regardless of the kind of system it is on or its location. It also allows concurrent integration of multiple business applications, whether stand-alone or host-connected. Communications of multiple types of information (text, data, image and voice) is also easily facilitated.

The future will bring a system that is "invisible" — where office workers think only about what has to be done, not how the system will do it. The industry is quickly moving to the time when a multifunction workstation will be plugged into the wall as part of an end-to-end, truly digital network.

Kenneth Sullivan is director of product marketing at Wang Laboratories, Inc. of Lowell, Mass.

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IS YOUR MICRO POLICY WORTH SAVING?

protect facilities from improper use. Such policies involve limiting the use of personal computing devices to noncritical applications, isolating the facilities to prevent unauthorized use and restricting their operation to authorized persons only. Generally speaking, responsibility for security of data resources is placed directly upon user management, much as that group is held responsible for other valuable or confidential assets.

2. Data integrity. Management concern in this area takes the form of policies that tend not to limit physical access to end-user facilities, but rather to specify the conditions under which these facilities may have access to the mainframe, the data base or the communications network. Implementation of such policies is almost universally the responsibility of the management information systems organization and is built into the systems programming and operating procedures of the mainframe computer/communications system.

3. Compatibility of hardware and software. Management recognition of the need to move in the direction of integrated systems is evidenced by the many policies intended to promote compatibility of end-user hardware and software. They are most frequently implemented through procurement guidelines and approval procedures that are the responsibility of the MIS organization.

4. Justification of cost. Corporate policies involving expenditures for personal computing generally extend beyond the normal financial justification requirements. In addition, such policies require justification of the feasibility and appropriateness of the application from a systems viewpoint. This additional justification is usually the responsibility of user management in consultation with the MIS organization.

Utilizing the resource

Beyond these management concerns, what needs to be considered is the overall challenge of effectively managing the growth in the use of these resources and the rapidly expanding number of users.

An essential first step is recognizing that we cannot afford to accept this phenomenon as simply the growth of a costly inventory of equipment. This growth must be managed to ensure that the varieties of equipment used adequately support individuals in their current jobs, promote compatibility and generally use the resource as efficiently as possible.

Organizations must look at the proliferation of personal computing equipment as a basis for building an information infrastructure that will support office automation as well as management decision making. To illustrate: As more and more terminals are deployed for decision-making support, the opportunities to use them for distribution of documents, for videotex and similar facilities become more meaningful, offering significant savings opportunities in terms of time, internal publishing costs, mail distribution and other office operating expenses.

In terms of costs, the goal of efficient deployment and utilization of resources is very much in tune with the larger goal of building an infrastructure. However, the importance of this objective must be recognized, because in some cases, developing an effective infrastructure will appear to cost more initially than allowing unguided proliferation of equipment.

Management concern must exist for several areas not yet recognized in day-to-day policies.

1. Support of work groups. A basic consideration is the need to distinguish between support for individuals and support for groups or departments, where the presence of an information infrastructure is particularly important.

For example, consider the office of a shipping distribution center, where the dozen or more order tracers in the office might require access to mass storage and communications linkage to points within the shipping center and to external sales offices as well. This group might effectively use a document generating and distributing system, an electronic mail system and a local data base system as part of the information infrastructure. It might be supported by nonintelligent terminals linked to a minicomputer.

2. Support of leading users. A major area of concern must be the identification and support of individual users whose work or work style turns them into "leading users." In that same shipping center, one shipment scheduler may emerge as a leading user who can benefit from sophisticated capacity planning, order sequencing and other quantitative approaches. Such an individual might benefit from a relatively powerful personal computer with extensive internal memory and graphics capability.

At some point, certain individuals will become heavy users of the computing resources, and it will become apparent that their own productivity and the effectiveness of the functions they perform can be further enhanced. These are the people who, in the normal range of applications, suddenly seem to need more or different resources.

To support such individuals effectively, it may be necessary to isolate their potential needs and capabilities, to determine their special requirements for additional resources and to evaluate the extent to which they can act as focal points for enhancing other activities within the organization. Applying and cost justifying additional support for such leading users is a major improvement opportunity.

3. User management involvement. Most companies simply do not have the resources to monitor and closely manage local use of computing resources. Typically, one staff specialist will support between 100 and 200 users, and most of this support is hand holding and trouble shooting, not monitoring day-to-day applications.

Attention needs to be given to working with user management to protect and enhance applications that become key to the workings of the department — particularly where perhaps only one or two individuals understand how to use the application. Further management attention is necessary, on the other hand, to avoid situations in which critical activities are exposed to unnecessary risk through improper use of the facilities.

A case can be made that support for most individuals will necessarily have to be limited to a basic level, with additional support provided for some advanced people. In addition, in each work group it is essential to search out opportunities to enhance the productivity of the whole group by creating an effective, cost-justified infrastructure of office automation utilities.

In most cases, the initial demand for such primary utilities as spreadsheets, word processing and electronic mail will provide sufficient benefits to justify creating the critical mass of users, applications and resources that provides the infrastructure upon which more advanced office automation and decision support applications can be built.

Dual responsibility for support

As end-user computing grows, it requires more than one kind of support. As MIS management considers support of the work group and support of individual users, it becomes a real question as to what people and computing resources should be made available.

While MIS operations, traditional applications development and the telecommunications function will increasingly be involved in supporting end-user computing, the key leverage points appear to be office automation and the information center. Currently there is a trend toward putting these functions under a single individual, but it is important to understand that office automation and the information center make distinct contributions.

Both the office automation group and the information center have legitimate involvement from different perspectives. Companies should be looking at ways of sorting out these two functions.

Supporting work groups with common utilities appears to be an office automation function that involves studying work and information flows to develop support activities such as electronic mail, document processing and other communications-based services. Support for individuals is more applications-oriented and may fall into the information center arena.

Essentially, the information center provides an environment in which the user can deal with the MIS department. There is, however, considerable variation as to how information centers are operated. Basically, they have grown up in two ways:

- One is along the lines of what we can call decision support — working closely with individual end users to develop applications suited to their particular decision-making needs. This approach typically uses mainframe-based data and systems already in place.
- In other organizations, information centers have grown up as a convenient way to disseminate and support personal computing. The information center was conceived as a place where people can walk in and try out different kinds of personal computers to familiarize themselves with the hardware and the basic software for such applications as spreadsheet preparation, text editing and data base manipulation.

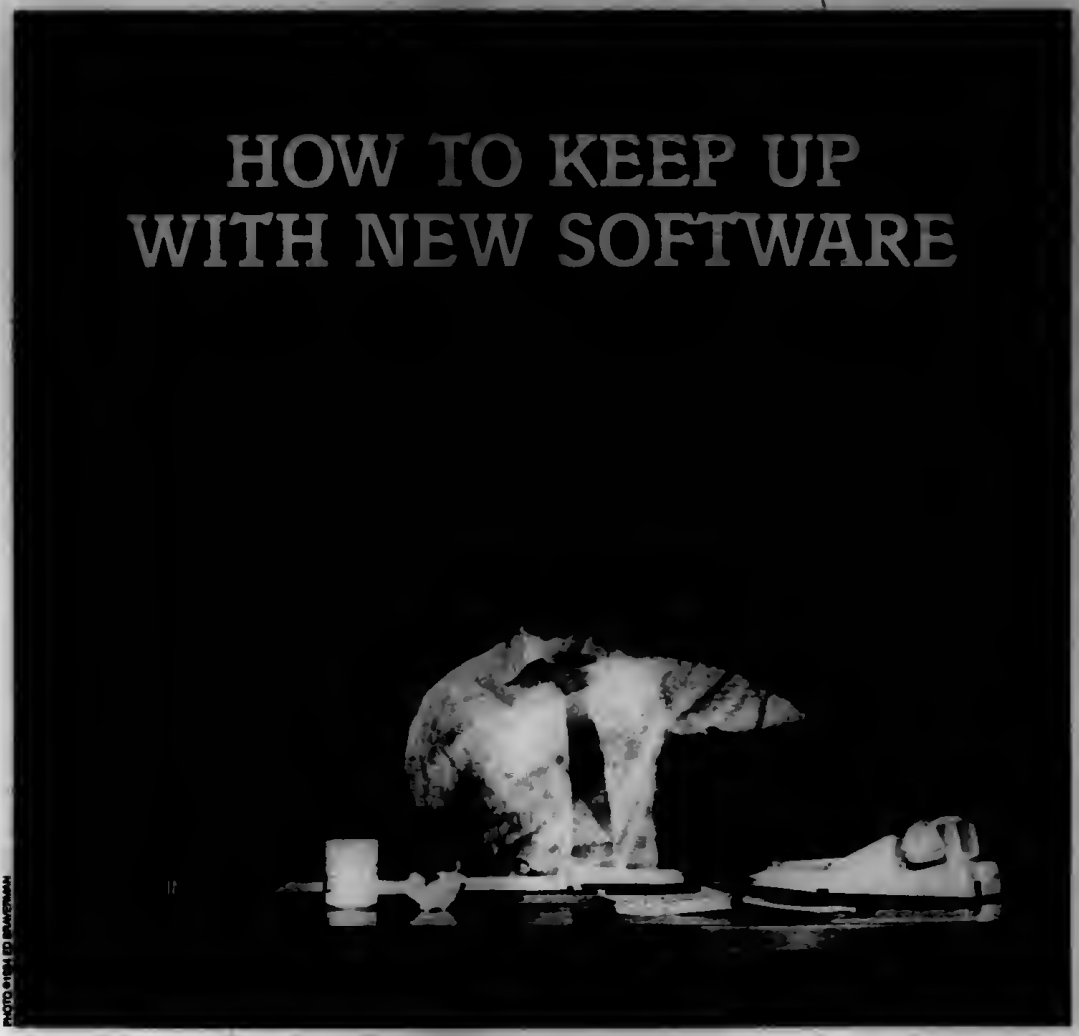
As the population of end users increases, it is unlikely that the information center will provide the locus of a great deal of day-to-day support for most people. Basically, they will be independent of it, using various utilities provided to them. Continuing low-level training will properly become embedded in the user organization through its own people. Increasingly, the information center will tend to specialize in the areas of new applications and new tools for application, leaving much of the utilities development and support to the office automation group.

The long-term benefits of personal computing will only be realized as it becomes embedded in the organizational culture.

In order to succeed with the limited resources available to MIS, user management must assume increasing responsibility for primary training, for organizational learning, for identifying potential applications and for assuring that use of available tools falls within the parameters of responsible management.

David Dell is director of research services at the Diebold Group, Inc., an international management consulting firm based in New York.

HOW TO KEEP UP WITH NEW SOFTWARE



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By Richard Strauss

Every month, 100 or more software products are introduced for the personal computer. Keeping up with what's available is like bailing out a rowboat with a thimble.

It's desirable, of course, to collect whatever information comes your way — and an especially good idea to keep files of software articles and reviews clipped from magazines. But rather than trying to keep up with all software developments, the bulk of your research efforts should be centered around specific needs within your organization as those needs arise.

Once you know what you're looking for, there are two approaches to finding it: Do it yourself or get help.

The first involves collecting all the product information you can and then making a selection. Since you do all the legwork, this method can be extremely time-consuming. If you are thorough, however, you are in an excellent position to make the ideal selection.

Getting help involves a middleman who collects and screens product information, then presents you with a narrowed field of products and a recommendation. You never look at products that for one reason or another have been disqualified. The final decision is still yours, but you have less to think about in arriving at your decision.

If the middleman does a good job of screening, getting help is clearly the more efficient way to search for a product. But if the middleman is biased or otherwise fails to consider the full range of products available to meet your needs — or if he doesn't understand your needs — you might be better off doing it yourself (if you have the time, of course).

Regardless of which method you choose, you have to get your information from somewhere. If you do it yourself, consider the following sources: books, directories, software reviews, magazine roundups,

software reports, advertisements, vendors, trade shows, retailers, associates and friends.

Books. Most bookstores carry guides for selecting products in the more popular categories. The books written by a research staff are generally less biased than those written by a single author, but in either case you can pick up some good information about the products you are considering.

The problem with books is that they usually do not have the latest products, and many of the less popular categories don't have any books at all. Another problem with books is that they can be misleading because they often draw conclusions about the products that don't take into account the way the products will be used in your organization.

But if you can find a book that covers the area you are investigating, it's a good start for getting an insight into the pros and cons of the products in that area. It's also a good way to learn about the benefits of the software in general.

Directories. Most directories list a wide range of products with a paragraph or two describing each. These descriptions are usually summaries of the products' features or strong points rather than critical evaluations. A comprehensive directory is a good place to find out what products are available to meet your needs, but unless you are looking for special features, directories won't do much to narrow your choices.

Neither will they have the latest products. For example, one of the leading directories of personal computer software lists 75 word processors — but does not mention three of the newest and best: Office Solutions' Officewriter, an excellent word processor; IBM's Displaywrite, a word processor that emulates the Displaywriter; and Leading Edge Products, Inc.'s Word Processor, a package with the power of a dedicated word processor and a competitive price.

A comprehensive directory is a good place to find out what products are available, but unless you are looking for special features, directories won't do much to narrow your choices.

Besides directories in book form, there are electronic directories that provide product information on-line. The information is more up-to-date than in book directories, but it is also more expensive — and you need a personal computer with communications capabilities to provide access.

Software reviews. The software reviews published by computer magazines can provide insight into particular products, but you should not rely on them to make your selection. Reviewers generally write from a limited perspective — they don't consider the full range of the product's potential uses or the various types of people who might be using the product.

If the people in your organization will be using the program differently from the way the reviewer uses it or if your organization's level of experience with the product category is different from that of the reviewer, the review probably won't be highly relevant to your search.

On top of that, it's not unusual for reviewers to have a bias in favor of the products they review. And most reviewers do not compare the product with others in its category.

Thus a product that gets a good review isn't necessarily the best — or even good — for your purpose. The review does, however, give you a feel for the product, and any negatives in the review should be considered red flags.

Magazine roundups. Many computer magazines carry articles about specific categories of software (in addition to software reviews).

These articles are of two basic types: buyers' guides and feature articles.

Buyers' guides cover particular software categories accompanied by charts listing features. These guides are like directories: They tell you what products are available and what features they have, but they usually don't help the reader much in narrowing his choices.

Even if a product is shown as lacking a special feature you are looking for, don't be too quick to rule it out — the charts in magazine roundups are notorious for errors.

Feature articles concentrate more on text and less on charts of features. They talk more about the overall benefits of the software and less about particular products.

To make a feature article manageable, the author may eliminate certain products in the category. For example, a recent article on project management software overlooked Softcorp, Inc.'s Pro-ject 6, a relatively new, highly capable, inexpensive program for projects of medium complexity. Another article on project managers ignored products selling for more than $500 — which elimi-

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nated two of the most capable programs for the professional project manager: Applied Business Technology Corp.'s Project Manager Workbench and Primavera Systems, Inc.'s Primavera Project Planner.

Software reports. A number of firms publish the equivalent of *Consumer Reports* for software. One is *Software Digest*, a periodical that reviews a different software category each month. A wide range of products is evaluated in each category, each product is examined by several evaluators and all products are judged by the same criteria.

As opposed to magazine reviews, *Software Digest* presents a collective opinion rather than an individual one and makes it easy to compare most of the products in the category.

There's a serious problem with software reports, however. Like the software review, they fail to consider that various users will be using the software for varying purposes — and what may be a good program in one instance may be totally inappropriate in another.

For example, in the data base category, *Software Digest* gave the No. 1 ranking to Powerbase Systems, Inc.'s Power-base, while Microrim, Inc.'s R:base 4000 ranked 15th. The two programs are as different as their rankings — but the difference is not their degree of desirability. Both are relational data base managers, but Power-base is a fill-in-the-blanks program and R:base is command-driven with a procedural language. Power-base is easier to learn, but R:base is more powerful. A middle manager setting up his own relational data base system would choose Power-base, while a programmer designing a sophisticated turnkey system would much prefer R:base. Reports like *Software Digest* simply do not provide the information to allow these distinctions to be made.

If you rely on ads to tell you what's available, you will miss a lot of products from smaller companies.

Software reports are best used to identify available products and to raise red flags to investigate further. If you know exactly what features you need in a program, reports are good also for preliminary product screening — but not for drawing final conclusions.

Advertisements. Software ads in newspapers and magazines can alert you to the existence of products and give you a rough feel for them, but they do little to help you compare the software with other packages you are considering. Ads don't even tell you what applications the products best suit, because vendors seem to think their products are best for all applications.

Advertisements are a good indication of what companies have the best financing, not necessarily the best products. If you rely on ads to tell you what's available, you will miss a lot of products published by smaller companies that do not advertise. Two examples of quality unadvertised products are Evergreen Software's PC-Calculator, a program that turns a computer into a sophisticated "pocket" calculator, and Applitek, Inc.'s DOS Commander, a utility that simplifies the use of IBM's PC-DOS.

Software reports are best used to identify available products and to raise red flags to investigate further.

Vendors. The best thing about advertising is that it tells you how to get in touch with another source of information, the software vendor. If a product appears to warrant further investigation, it is worth a call to the vendor to see if you can get a demo disk or evaluation copy.

Evaluation copies are usually full working copies of the program, and they give you the advantage of testing the software in your own working environment. You probably will not be able to talk a vendor into sending you an evaluation copy if you plan to buy only a single copy, but if you intend to make a large purchase, you have a good shot at getting one.

Trade shows. Attending computer trade shows can be an effective way of seeing what is available and at the same time getting a feel for the products on display. Although shows will not give you much hands-on experience, they are a great opportunity for requesting evaluation copies for your testing when you get back to the office.

If a program you are considering is a hot new release, don't expect to find out much about it at the show — unless you are very aggressive in fighting the crowds around you. You are better off concentrating on making a contact that can supply you with information after the show is over.

As with magazine advertising, you will miss a lot of small but important

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programs if you rely on trade shows for your information. For example, Kensington Microware Ltd.'s Remote Control is not at the shows, but it nevertheless is an excellent product for connecting your lap-size computer to an IBM Personal Computer. Eastern Software Products' LP-88, a linear programming package, is another important program absent from the shows.

Retailers. You can get a lot of good product information from a software retailer — if he carries the products you are considering. Sales representatives are glad to give you a product demonstration or let you sit down at a machine with a demo disk, but don't expect to walk into a store and compare half a dozen products that are in the running for your final selection. Retailers tend to concentrate their efforts on just a few products in each category, so the retail store is not the ideal place for comparison shopping.

The first thing to consider in hiring a consultant is where he gets his information.

In fact, there are some categories of products that the retailer does not stock at all. Some manufacturers do not consider the retail store an appropriate distribution channel. For example, if you are considering SPSS, Inc.'s SPSS/PC — the most powerful statistics program for the IBM Personal Computer — you won't find it at your neighborhood computer store.

Other products are simply too expensive to be carried by retailers. Execucom Systems Corp.'s IFPS/Personal, for example, sells for $1,500. Its price keeps it out of most retail stores, yet it is a top-notch financial modeling package for corporate use.

Associates and friends. There's nothing wrong with word of mouth for judging software. Anyone who has used a product you are evaluating can provide valuable information.

But consider the source: If the person uses the product in a way that's different from how it will be used in your organization, take his comments with a grain of salt. Also ask him what other products he looked at before buying the one he's using. He may have missed the one he should have bought.

Now that you have collected all this information, what do you do with it? There's no magic formula — you just put it all together and decide which product looks best in light of how it will be used in your organization. Or you could take the second approach for screening products: Get help.

There are two primary sources of information for getting help: software consultants and specialized software distributors.

Software consultants. The first thing to consider in hiring a consultant is where he gets his information. As the discussion here indicates, information can come from a variety of sources, and gathering it is time-consuming. Ideally the consultant will have similar assignments from other clients so that he can realize some economies of scale in conducting his research.

Consultants are expensive — but so is your time. If your consultant is doing his job, he is probably worth every penny he charges.

Be on guard if the consultant spends significantly less than full time evaluating personal computer software. In fact, keeping abreast of software developments is more than a full-time job; covering the range of software categories requires several people. If your needs cut across several product categories, you probably need a research organization rather than an individual.

The biggest danger in using a consultant is paying an arm and a leg to come up with an adequate but not superior solution to your software problem. Consultants, like everyone else, tend to have a bias toward the products they already know — and they may overlook the best product in favor of the one they know best.

On the other hand, a consultant who is doing his job will take the time to learn

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The biggest danger in using a consultant is paying an arm and a leg to come up with an adequate but not superior solution to your problem.

your needs, then systematically weed out the products that are inappropriate and present you with only the winners — along with a recommendation.

With only a few products to consider, you will not be distracted by an array of product features and claims. Your final decision will be far easier.

Specialized software distribution. There are a few relatively new companies that specialize in selling software directly to large companies. Those with in-house product evaluation staffs can provide the same services as a consultant. They narrow the field of products and present you with recommendations.

The process used by these distributors is less personal than that used by a consultant because the initial screening of products is made without a specific customer in mind. My company, for example, is a specialized distributor based in Waltham, Mass. Corporate Software, Inc. has an evaluation staff that screens thousands of products. The programs that survive the screening process — about 2% of those evaluated — are the ones that meet a need likely to be found in a large company.

Some specialized distributors publish the results of their evaluations. Corporate Software provides information on the products it considers "winners" in *The Corporate Software Guide*, a quarterly publication currently containing evaluations of 200 products in 20 categories.

Besides narrowing your choices, a publication like this guide in effect provides product recommendations by suggesting the programs that are appropriate and inappropriate for various corporate needs.

If you need further information, the distributor's staff can answer questions and provide demo disks and evaluation copies.

Although a specialized distributor can be valuable in helping you match products to needs, it cannot provide the personalized service necessary to define your needs in the first place. For example, if you are not sure whether presentation graphics software is a cost-effective alternative to your graphics department, don't look to a specialized distributor for a cost-benefit analysis.

But if you know that you need software and you know what you want it to do, a specialized distributor can go a long way toward helping you find it.

A word of caution: Specialized distributors target large corporations. If you are a small business, you may not qualify to receive the assistance these distributors provide.

Having described the two approaches for gathering information, we suggest you use neither exclusively but rather a combination of the two.

Doing it yourself is good for gaining an overall familiarity with the various software products that are relevant to your business, and getting help will save you time in narrowing the field. Once you've identified the finalists, go back to your own sources for help in making the final decision.

And let someone else worry about bailing out the rowboat.

Richard Strauss is vice-president, products, for Corporate Software, Inc., a Waltham, Mass., distributor that specializes in supplying personal computer software to large corporations.

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NIGHTMARE.

By Eric Vogt

Software developers stand to realize sales of more than $14 billion over the next five years, market forecasters estimate. This prediction will hold up if — an this is a big if — developers get off the features bandwagon and shift their focus to the people who use the software.

Much of the personal computer software developed and marketed today emanates from the minds and practices of a clever few, rather than from thoughtful market research and testing.

To sell software in 1985, developers will have to realign their marketing strategies. Personal computer users, whose numbers continue to swell, are becoming more sophisticated, with more complex needs. The strategy of touting a single

THREE CONTENDERS	ELECTRIC DESK	FRAME-WORK	SYMPHONY
Number crunching	good	fair	good
Business graphics	none	fair	good*
Text management	good	good	fair
Thought processing	fair	good	bad
Intuitive operation	fair	fair	bad
Understandable display	good	fair	fair
Ease of learning:			
For novice	good	fair	bad
For spreadsheeter	good	fair	good
For word processor	good	good	bad
For data base user	good	good	fair
Accommodates increasing skill	fair	good	good
Quality of documentation	good	good	fair
Movement between capabilities	fair	good	fair
Movement between projects	good	good	fair
Integration with other software	fair	fair	fair
Central environment	svc. menu	desktop	sprdsht
Hardware requirements	256K bytes	256K bytes	312K bytes
List price	$345	$695	$695

* Symphony, while offering substantially enhanced graphics generation capabilities, shares with its predecessor, 1-2-3, the annoying necessity of booting a separate program for printing graphs.

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software package — even an "integrated" one — as appropriate for a variety of business users and their problem-solving styles won't work. Software developers must instead begin to understand and apply the concept of market segmentation.

Some argue that the software industry is simple and can employ record industry marketing strategies, albeit with more packaging and higher margins. Although this idea may at first seem humorous, the parallels are many: advertising on national TV, promoting a software author's or artist's personality to sell products, searching for new artists, negotiating contracts, priming the retail chains, designing an attention-getting package, fighting for shelf space and hoping for the hit. One can even draw parallels on the piracy issue.

When software is marketed as if it were just expensive records, a business user may spend more than $500 for a software diskette and end up feeling as though he has bought "Michael Jackson's Greatest Hits." But he gets only the drums and bass guitar parts. To produce the full value of his investment, he is expected to play lead guitar, sing and dance.

While this strategy works like a charm for Spinnaker Software Corp., Infocom, Inc., Broderbund Software and other companies whose products don't exceed a list price of about $49.95, as we move above the $50 mark in personal computer software, and particularly above $100, we enter another industry altogether. At these higher prices, we observe an industry in which the evolution and competitive dynamics are similar to those of the calculator industry.

Remember Texas Instruments, Inc.'s Datamath and the Bowmar Brain? Their software counterparts today are Ashton-Tate's Dbase II and Software Arts, Inc.'s Visi Calc. Hewlett-Packard Co. then came out with more features and a different user interface, analogous to Lotus Development Corp. 1-2-3's market entry. Even the great calculator war — during which the prices came down and suppliers scrambled to add features and flexibility, lower power consumption and increase speed — can be compared to Symphony's and Framework's appearances this past summer. Each package has flexible "DOS hooks" and the ability to be programmed for unusually complex and sophisticated applications.

Through the entire process, the people who earned consistent margins from calculator sales fell into three classes:

- Volume-oriented cost cutters: Casio, Sharp Electronics Corp.
- Market-oriented innovators: HP.
- Controllers of distribution channels: K-Mart Corp. and Sears Roebuck & Co.

Consider the opportunities this analogy defines for the next wave of software. Since the low-end limit of cost competition in software is clearly occupied by Freeware, one can dispense with this issue and focus on the opportunities in market-oriented innovation and distribution.

The essence of the market issue is embodied in two questions:

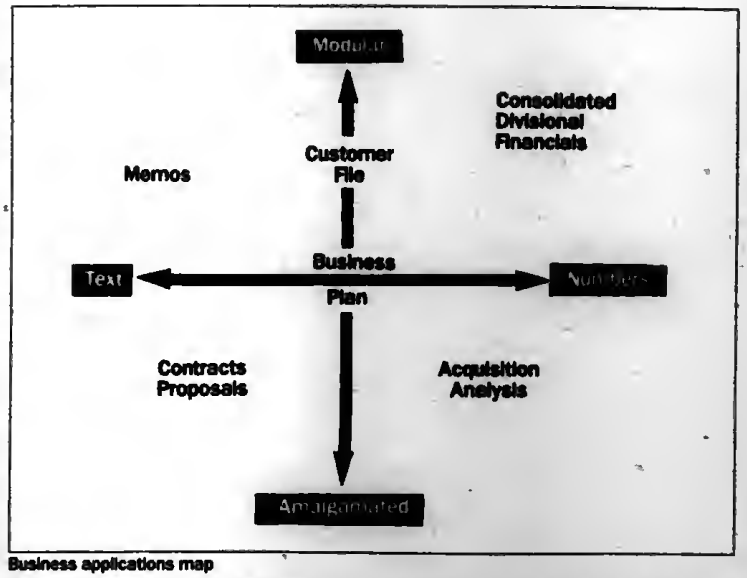
- Who will use this tool?
- What task will they try to accomplish?

Users may be grouped simply along two dimensions: degree of experience and, frequently, degree of need. For a software supplier, this structure can provide some guidelines with regard to the frequency level of on-screen reminders and the tolerance the user might have for multiple features.

In considering the universe of possible business tasks to be performed by the target population, the following questions must be asked:

- Will users work mostly with text or with numbers?
- Are the tasks modular, or do they naturally form one amalgamated problem?

From the software developer and marketer's point of view, a market segmentation in these terms clarifies the performance trade-offs that must be made during design and development. Large-scale numeric analyses will cry out to utilize an 8087 microprocessor, while pure text applications must grapple with the issues of random-access memory (RAM) speed with limited storage vs. constant disk access.



Business applications map

The era of the "across-the-board" software package is long gone. In fact, one might argue that some of the new integrated software products suffer from trying to spread themselves too thin across these divergent applications. A clear-cut needs analysis will identify those applications for which a tried and true stand-alone package, such as Software Publishing, Inc.'s PFS:File or Micropro International Corp.'s Wordstar might, indeed, solve the problem most efficiently.

As the user becomes more sophisticated, one might add a third axis to the matrix: access to other data, either external data (via modem) or internal data, residing in other disk files, for instance.

Lotus' Symphony and Ashton-Tate's Framework have answered this need by supplying communications software as well as the ability to move through DOS and attach other applications, such as Dbase III. These are marvelous tools, yet presenting these options to people whose tasks don't require them and whose experience makes them feel shy and unsuccessful could pose a barrier to wide-scale acceptance.

Ironically, as the software itself is showing a clear trend toward user and task segmentation, the evolution of distribution continues to lag, with what is essentially a single channel. The major retailers parcel out their limited shelf space (both physical and psychic) to those products for which they anticipate the best sales. Clearly, this channel is overloaded.

New entrants in the software market must revise their approach. The development process must, in the future, be driven not by the capabilities of technical personnel, but by a systematic investigation of conditions in the market. If they are to identify "windows of opportunity" in the software market, successful software publishers will not wait until the code is written to have their first contact with their users. Rather, they will turn to the users beforehand to direct their efforts.

In addition to the trend toward software with greater market focus, we expect to see successful personal computer software publishers developing new channels of distribution — perhaps channels that incorporate pieces of added value currently missing from today's offerings, for example, user education. Drawing on analogies from other industries, someone is bound to develop the "Avon" and "Tupperware" distribution channels as well.

Finally, once the new software is ready to ship, developers will no longer be able to delegate the selling task completely to the retailer. They will have to take on the marketing task themselves — a trend already evidenced by the advertising budgets of Lotus and Ashton-Tate.

But can a 30-second spot say enough about the relevant aspects of one of today's software packages? We think not. Developers, to fill this information gap and reduce demands on the retail sales representative, will increasingly include demonstrations and completed applications as part of their marketing efforts. Software houses will also intensify their direct competition for corporate sales.

In this environment, effective user education will assume an even greater role, both for the corporations depending on the productivity of the technology for their success and for the publishers depending on the rapid adoption and popularity of the software within the target market segment for their success.

Eric Vogt is founder and president of Micro Mentor, Inc., a Cambridge, Mass., company that provides executive-level instruction in the use of personal computers.

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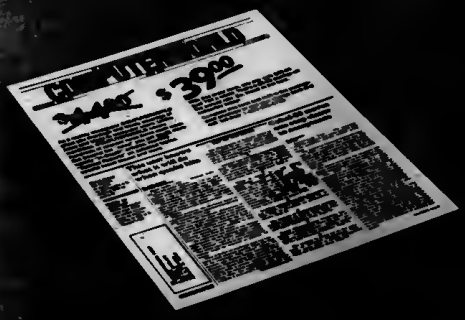

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AT

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hardware) setting. The AT is the centerpiece of IBM's new PC Network — an offering that fits into the company's larger scheme to link all of its computer products.

Mix and match

The Personal Computer AT comes in two basic models, both of which can be easily customized. Model 68, priced at $3,995, has 256K bytes of installed random-access memory (RAM) and a single half-height, 5¼-in. floppy disk drive with 1.2M bytes of storage, four times the amount of the Personal Computer's 360K-byte floppy drive. Model 99 lists for $5,795 and features 512K bytes of installed RAM, the 1.2M-byte floppy disk drive, a combination serial and parallel board and a full-height, 20M-byte hard disk. (By comparison, $4,395 buys a Personal Computer XT with 256K bytes of RAM, a 360K-byte floppy disk drive, a serial board and a 10M-byte hard disk.)

Both AT models are built around the Intel 6-MHz, 16-bit 80286 microprocessor and IBM's new 16-bit I/O bus, performing at a rate two to three times faster than the Personal Computer. While the added speed won't make you a more accomplished typist or quicken the pulse of your printer, it will hasten copying files, recalculating worksheets and sorting data base records. Common to the two versions of the AT are 64K bytes of read-only memory (ROM) (including an enhanced Basic interpreter), the capacity for up to 3M bytes of user memory, a real-time clock/calendar with battery backup, a socket for the 80287 math coprocessor, a combination floppy disk and hard disk controller board, eight expansion slots and a 192W power supply (including a fan whose speed varies with the temperatures, reducing noise).

The AT boasts a revamped 84-key keyboard with modifications that are apt to please critics of the Personal Computers. The AT keyboard, however, cannot be used with the Personal Computer or any other product in IBM's Personal Computer family. One other accoutrement of note is Keylock, a security lock on the front of the system unit designed to control access in network settings. Locking the AT prevents rebooting, shuts down the keyboard and prohibits removal of the system unit cover. Keylock is also available for the Personal Computer, the XT and the XT/370.

IBM's confidence in its latest entry extends to service. The company is including a one-year warranty with the product.

The new IBM machine does not include a video board or a monitor. The Personal Computer's monochrome and color graphics boards work on the AT, but quite a bit of the existing Personal Computer hardware doesn't. Among the options for the AT are a half-height, 5¼-in. 320/360K-byte floppy disk drive, a second internal 20M-byte hard disk, a floor-standing enclosure and a tilt-and-swivel monitor stand (suitable for the entire Personal Computer line).

Although it is a slightly different kind of option, DOS 3.00 is the AT's new single-user, single-tasking operating system; it is priced at $65.

Media and the message

The AT is most modular in the area of disk storage. The machine is equipped with compartments for three disk drives — either two half-height floppy drives and a full-height, 20M-byte hard disk or a single half-height floppy drive and two full-height, 20M-byte hard disks. The second hard disk is tucked beneath the 1.2M-byte floppy drive in the AT's right-hand compartment. Incidentally, a 1.2M-byte floppy lists for only $225 more than the new half-height, 320/360K-byte drive.

In addition to mixed and matched disk drives, the AT offers a choice of floppy disk drive capacities. DOS 3.00, the AT's primary operating system, reads and writes in the traditional 320/360K floppy format, but IBM is selling the AT's 320/360K unit only as a second floppy drive. DOS 3.00 is tailored to the 1.2M-byte floppy drive — and that means certain limitations as well as added storage space.

If you require data interchange via standard 320/360K disks, you'll need to add the AT's 320/360K floppy drive. The 1.2M-byte floppy drive can read and write in the 320/360K formats, but what it writes can only be read by the 1.2M-byte read/

Maybe it's time for Victor.

write head. That head is narrower — and thus more sensitive — than the read/write head in the Personal Computer's 320/360K drive.

Not surprisingly, the AT relies on new disk media capable of handling the higher density format. IBM's high-capacity disks were designed to be formatted with twice as many tracks in the same 5¼-in. space — 80 as opposed to the old 40. The high-capacity format uses 15 sectors per track, in contrast with the eight used for disks formatted under DOS 1.00 or 1.10 and nine for those under DOS 2.00 or 2.10. Data stored in the new format cannot be accessed under DOS 2.00 or 2.10 without the addition of drivers. A box of 10 high-density disks runs about $80, but the new format proves to be a better value per byte of storage than its predecessor.

Playing the slots

The AT was built to grow. The machine features eight full-length expansion slots, each with a standard 62-pin connector that accepts boards designed for the Personal Computer's 8-bit data bus. Six of the eight slots are accompanied by an additional 36-pin connector that makes it possible to transfer data in 16-bit segments and address more than 1M byte of memory.

The combination floppy and hard disk controller board fills one 16-bit slot on the Model 68, leaving seven slots free. The combination serial and parallel board takes up an additional 16-bit slot in the Model 99.

Power users can have a field day with the AT's potential for additional RAM. IBM has filled half the 36 RAM sockets on the Model 68's motherboard with "memory modules," each consisting of two 64K-by-1-bit RAM chips piggybacked one atop the other. (Nine regular 64K-by-1-bit RAM chips provide 64K bytes of RAM on a Personal Computer; nine of the piggybacked chips provide 128K bytes.) The AT motherboard accepts only these unique modules and only in increments of 18 — thus supplying the Model 68's 256K bytes of RAM. The Model 99 features 36 such piggyback modules, filling the motherboard RAM sockets. To beef up the Model 68's RAM to 512K, you can buy a 256K memory module expansion kit for $495. But before you can add the memory expansion board to the Model 68, you'll first need to fill the motherboard's RAM sockets.

Either AT model can accept one 128K-byte memory expansion option once the motherboard is filled with RAM. This brings the machine up to 640K — the maximum addressable RAM in the Personal Computer's architecture. (The Intel 8088 addresses 1,024K bytes of memory; but the last 384K is reserved for functions other than user RAM.) Part of the appeal of the 80286 is its ability to address up to 16M bytes of RAM. Accordingly, IBM enables you to increase the 512K-byte AT to 3M bytes, in five allotments of 512K.

Power users can have a field day with the AT's potential for additional RAM.

Theoretically, products from third parties could boost RAM beyond 512K bytes per board, which would enable RAM in the AT to exceed 3M bytes. All this RAM is open to Xenix users, but aside from DOS 3.00's Vdisk (RAM disk) utility, DOS 3.00 function calls (upon which application programs rely) cannot recognize more than 1M byte of RAM.

None of Big Blue's memory expansion options includes the new (and still scarce) 256K-by-1-bit RAM chips. All the new memory expansion boards for the AT require a 16-bit slot.

Managing memory

What will you do with all that RAM? Tim Sammons, a consultant who heads Sammons & Associates in Berkeley, Calif., suggests that the AT's capacity initially will encourage users to rely on multiple RAM disks. "You'll be able to bring software and data into memory and then do your processing without repeated floppy disk reads. This increase in speed will be helpful in large data management applications."

VICT R

Sammons says he is convinced that, over time, extra RAM will make software both easier to use and more intelligent. Help files and truly helpful error messages will be readily available and not confined to a disk. Expert systems and artificial intelligence in general, now suffering under the RAM limitations of current machines, may also get a shot in the arm from the AT's prodigious memory.

But perhaps the major assignment in store for the AT's extended RAM is multitasking — the capacity for one machine to execute several jobs simultaneously. In this role, the 80286 truly shines. When multitasking applications are assigned to an XT, for example, there are no hardware circuits to keep tasks separate, and, thus, applications can write over each other in memory. The 80286 partitions memory, essentially setting up fences between segments of RAM. In this case, good fences do make good neighbors. The XT's 8088 can perform multiple tasks, relying on such window managers as Topview and Desq, but RAM is defenseless against overwrites.

In addition to its multitasking prowess, the AT has the ability to function in a multiuser environment, enabling several users to share it simultaneously. The machine's supply of serial ports initially limits it to three users — two at workstations and one at the host.

In order for the 80286 to serve multiple users and perform multiple tasks safely, the AT requires an appropriate operating system. Enter PC Xenix, a version of Unix System III adapted for IBM by Microsoft Corp. The 80286 is capable of operating in two modes. Under multiuser/multitasking Xenix, the chip works in the protected (that is, memory-protected) mode. When the AT runs under DOS, the 80286 operates in the compatibility mode — so called because the 80286 works with software for the 8088/8086 family of processors. When you boot the AT, the operating system used determines whether the machine is in the compatibility or the protected mode. (PCIX, a version of Unix for the 8088, runs on the AT in the compatibility mode.)

AT as server

PC Xenix unquestionably makes good use of the 80286, but the AT's multitasking/multiuser operating system won't be available for a few more weeks. Applications written for Xenix may not be plentiful for quite a while, and with the AT initially supporting just three users simultaneously, IBM has only skittishly entered the Personal Computer-based multiuser market. Even if third parties load the AT with serial ports (which Xenix and the 80286 can handle easily), IBM has another communications role in mind for its latest machine. Networking is the name of Big Blue's new game.

At the time it introduced the AT, IBM unveiled its PC Network for resource and data sharing. The network places the AT at center stage as a file server capable of simultaneously acting as a workstation. But consistent with its emphasis on peer-to-peer communications, the PC Network accepts an XT or another hard disk compatible as server.

In this way, IBM's Personal Computer-based local-area network enables the company to maintain a "PC philosophy." IBM, after all, is interested in selling and linking Personal Computers, not Ascii workstations. While a true multiuser system shares processing power among users who typically rely on dumb terminals, the PC Network fosters file and hardware sharing among users equipped with processors of their own.

Consultant Sammons puts it this way: "Relying on shared logic systems diverges from IBM's basic strategy. IBM would rather have customers buy minicomputers, not personal computers, for shared logic." Will Zachmann, a market analyst with International Data Corp. of Framingham, Mass., concurs: "Multiuser systems represent a much more limited market [than stand-alone personal computers do]. Networking Personal Computers is a perfectly viable alternative — one that individual managers prefer."

Betting on broadband

Early this year, IBM announced that its proprietary network to link Personal Computers, minis and mainframes would not be released for roughly two years. This

IBM claims that the PC Network can easily be installed in a small business. It can link as many as 72 Personal Computers within a 1,000-foot radius.

ambitious network is based on a token-passing ring arrangement that relies on twisted-pair cabling. (In a token-passing ring configuration, computers are connected in a circle. A single "token" or signal, representing the right to transmit data on the network, is passed around to each computer. Twisted-pair wires provide an inexpensive connection among computers and transmit frequencies over a single channel.)

Aware that market interest might burn out while the company fiddled, IBM released its version of a broadband Personal Computer-based network developed by Sytek, Inc. of Mountain View, Calif. (A broadband local-area network links computers with a cable capable of rapidly carrying many signals at once.) IBM claims that the PC Network announced in August can easily be installed in a small business. Tim Sammons agrees, calling the network "ready-to-wear."

The PC Network consists of the kind of coaxial cable used for cable television, a $695 network board for each Personal Computer and a $595 translator unit for each network. The translator, which converts the incoming signal to a frequency that all network adapters can receive, is connected by cable to as many as eight Personal Computers in a 200-foot radius. Connecting more than eight systems or extending the radius requires a Base Expander, which is essentially a repeater that boosts the signal.

The PC Network can link as many as 72 Personal Computers within a 1,000-foot radius. This is achieved through the use of Base Expanders and Short-, Medium- or Long-Distance Kits (which include cables and connect up to eight Personal Computers). IBM claims that with the addition of third-party hardware and installation help, the network supports a

AT PRICES

Personal Computer AT
IBM Entry Systems Division
P.O. Box 1328
Boca Raton, Fla. 33432

List price: Model 68, $3,995; Model 99, $5,795; 128K memory expansion option, $350; 256K memory module kit, $495; 512K memory expansion option, $1,125; 1.2M-byte disk drive option, $650; 20M-byte hard disk option, $1,595; 360K disk drive option, $425.

PC Network Hardware
List price: network board, $695; translator unit, $595; Base Expander, $59; Short-Distance Kit, $39; Medium-Distance Kit, $79; Long-Distance Kit, $89; 25-ft cable, $29; 50-ft cable, $39; 100-ft cable, $59; 200-ft cable, $99.

PC Network Program
List price: $75

Topview
List price: $149; Programmers Toolkit, $395.

PC-DOS 3.00
List price: $65

PC-DOS 3.10
List price: $65

PC Xenix
List price: $395; software development system, $455; text formatting system, $145.

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maximum of 1,000 nodes within a three-mile radius.

Data is transmitted throughout the network at a rate of 2M bit/sec via the CSMA/CD (carrier sense multiple access with collision detection) protocol. (CSMA/CD is a common, proven networking technique in which a Personal Computer sends a packet of data only when the network is quiet. If two computers send a packet at the same time, each will recognize that the packets have been scrambled, then will alternately check network traffic before resending.)

From computer to computer, the data transfer rate is 200K bit/sec. By using coaxial cable to transmit a broad band of frequencies, the PC Network can send voice and video as well as data.

The heart of the network is the board, made by Sytek to IBM's specifications. The board fits into an 8-bit slot in any member of the Personal Computer family, except the PCjr and the PC Expansion Unit.

PC Xenix doesn't support the PC Network, but DOS 3.10 does.

The adapter includes a pair of Intel coprocessors, the 80188 and the 82586, which operate at the same 6-MHz rate as the 80286.

The 80188, which incorporates the 8088 and support chips into a single unit, works with a 32K ROM module on the board to manage the network (including power-up, protocol processing, error detection and transmission). The 80188 also governs the 82586, which controls communications with the network via an RF modem on the board.

An 8K-byte ROM module, the Netbios, serves as the basic I/O system between the network and the host Personal Computer. The software on the network board generates a "session-level interface" (that is, menus). The board also includes 16K bytes of RAM, set aside as a buffer. IBM released the board in August in the hope that software developers would write applications directly for the Netbios.

Another DOS on the way

PC Xenix doesn't support the PC Network, but DOS 3.10 does. DOS 3.10 will replace DOS 3.00 but not DOS 2.10. DOS 3.10, which IBM says will be available as a "trade-up" option for $30, is 3.00 plus support for PC Network hardware and software.

DOS 3.10 will work with all members of the IBM Personal Computer family (except the PCjr) and will occupy the same amount of memory as DOS 3.00.

DOS 3.00 has file-sharing capabilities (via the SHARE command) but lacks 3.10's network "redirector" facility. According to Dave Crane, a Dallas-based consultant, the redirector intercepts application program calls (such as those for disk or printer services) and redirects them into the network as required. The redirector also fields responses from the network and passes them to the application program.

The PC Network requires local-area network software in addition to that etched in ROM. The PC Network Program, priced at $75 and scheduled for release around the same time as DOS 3.10,

DOS 3.10 will work with all of the Personal Computer family (except the PCjr) and will occupy the same amount of memory as DOS 3.00.

will provide server capabilities for file, print and message functions.

Crane notes that the PC Network Program will use DOS 3.10 to share resources and information among Personal Computers. The majority of applications running under DOS are expected to work with the new server functions.

"The software obviously controls the local-area network hardware, but unlike a lot of networks out there, it supports multiple file servers and peer-to-peer communications," Crane says. "Concurrent access to data by multiple users is also supported through sharing functions that still manage to maintain data integrity."

The PC Network is hardly IBM's last word on local-area nets. In addition to this peer-to-peer offering, IBM has endorsed the token-ring network, an industrial broadband coaxial network and the PC Cluster announced last spring.

IBM is especially committed to building a bridge between the local broadband PC Network and the potentially more pervasive token-ring plan.

Mindful of these seeming disparities, Big Blue has issued a "statement of direction" affirming its intention to connect all its networks. IBM is especially committed to building a bridge between the local broadband PC Network and the potentially more pervasive token-ring plan.

"Personal Computers will be able to be attached to both networks," says Bill Osborne, a senior planner for IBM.

"There are multiple ways of doing so, and we could do it now — it's not a technological problem," he adds.

(Of all of IBM's networking strategies, the PC Cluster remains the most rudimentary. The PC Network permits file sharing using hard disks as servers, but the PC Cluster doesn't.)

Tim Sammons, who relied on Sytek's local-area network in wiring the Democratic National Convention last summer, points out that the IBM/Sytek network fills a definite need.

Gaining mastery of the AT may entail a lengthy learning process.

"It enables incompatible equipment — printers, character readers and so on — to communicate," Sammons says. "But Sytek is not the answer for everyone — it's primarily for those who have an eclectic mix of equipment already. Sytek doesn't provide top-flight integration, just a good level of performance."

With the AT batting cleanup, IBM is a formidable player in the network ballgame. But the new computer is surely among Big Blue's most complex small machines, and gaining mastery of its standalone and communications characteristics may entail a lengthy learning process.

"For some organizations, this could even be a first computer," says IBM's David Camm. "The network will provide interesting capabilities, but I don't want to categorize the AT's market size or the machine's niche. Let's just say that the facility for expansion is there."

Ken Greenberg is an assistant editor at PC World, *based in San Francisco. Karl Koessel is technical editor. This article is appearing in the December issue of* PC World *as part of the Hands On section devoted to the AT.*

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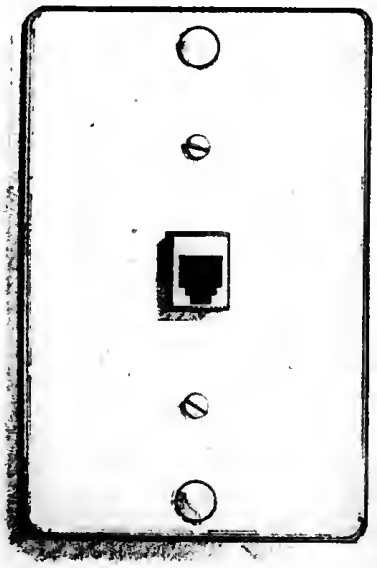

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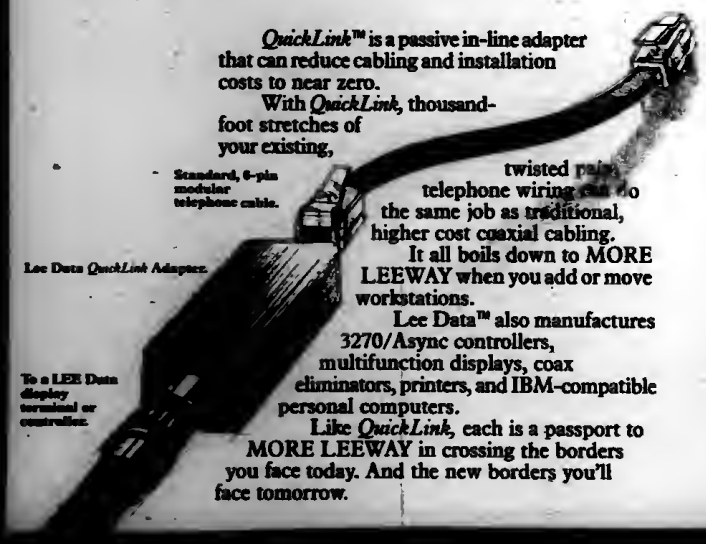

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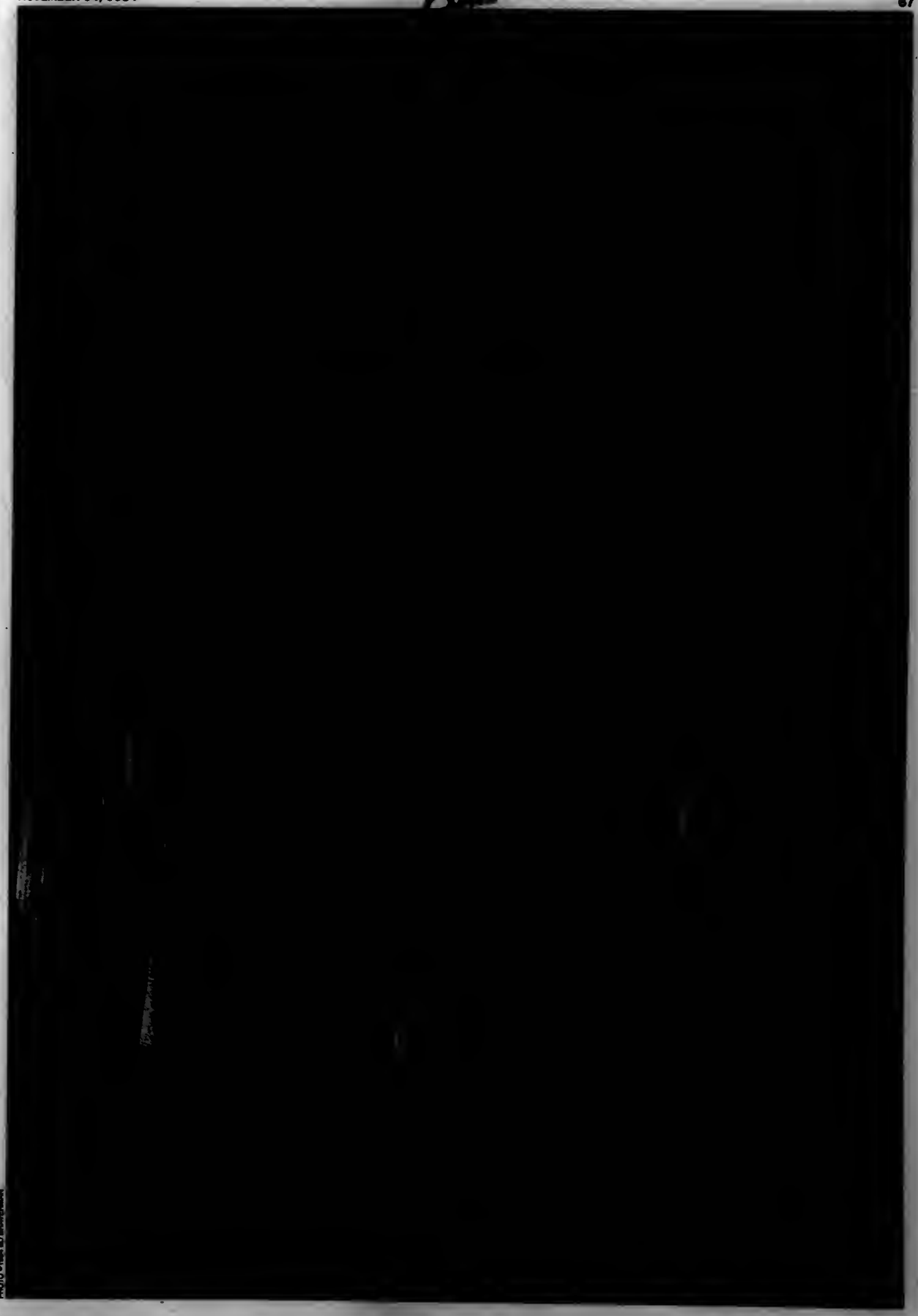

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THE SURVEY

The study took place this summer among individuals on a list of top computer executives compiled by ACR Corp. of Phoenix. ACR randomly drew 1,000 names from its total list of 8,960. Each was sent a questionnaire on June 6, and 439 usable responses were received. The CW Communications Research Department tabulated the results.

Nearly half of all respondents were directors, managers or supervisors of MIS or DP services, and another 14% classified themselves as directors or managers of operations, planning or administrative services. Twenty-three percent were corporate officers.

Respondents' organizations represented all industry categories, with the largest percentages from manufacturing (22.4%) and finance, insurance or real estate (13.2%). Median company size, measured by sales revenues, was in the $60 million to $249 million range, with nearly 4% of companies claiming sales revenues in excess of $10 billion.

Respondents as a group were overwhelmingly male (94.8%), with a median age of 42 to 45. They earned a median salary of $50,000 to $60,000; more than 30% took home $60,000 or more.

Thirty-four percent of respondents said that a staff member had been added to handle purchase and use of micros

of the organizations (Item 7).

Among the two-thirds of respondents who said that one department is primarily responsible for personal computers in the organization (Item 3), 81.7% said that the department to do this is MIS or DP (Item 3a). Forty-one percent of these same respondents said that the specific person responsible for personal computers was the director of DP (Item 3b).

Thirty-four percent of respondents said that a person had been added to their organization's staff to handle the purchase and use of personal computers (Item 4), and 66% reported that this person, whatever his title, was to be found in the MIS or DP department.

In a separate question, respondents were asked in what ways the MIS or DP department gets involved in the purchase and utilization of personal computers. That involvement is extensive (Item 6). In more than three-fourths of the cases, the MIS or DP department takes part in:

- Advising the user department on purchase.
- Coaching users in setup and operation.
- Coaching users with specific problems.

In addition, half of the respondents said their MIS or DP department is responsible for training users. In almost half the cases, they are involved in:

- Planning use and applications.
- Establishing an approved vendor list.
- Buying personal computers for other departments.

Nearly three-fourths of respondents said their MIS or DP department "plays the major role" in personal computer software recommendations and purchasing. The next department is the user department, but that is cited by less than 20% of respondents, and top corporate management comes in a weak third with 7.2% (Item 8).

Operating systems

With regard to operating systems standards, respondents were asked which operating systems they thought personal computers should support, and the winner was Microsoft Corp.'s MS-DOS, with nearly three-fourths of the vote. Unix was next, with 51.3%, and all others were selected by less than half of the respondents (Item 9).

It is perhaps an indication of the difficulty of training people to use personal computers that so many methods seem to be employed by these companies. All four of the training methods we asked about received a substantial number of votes (use of training packages, training by MIS or DP staff, in-house classroom training and outside seminars).

In sum, we see a pattern of heavy use of personal computers across a broad spectrum of industries and organizations. We find the MIS and DP departments heavily involved in implementing this technology in their organizations.

In addition, the study shows extensive plans for increasing numbers of personal computers as well as more integration of these devices into corporate networks with mainframe access.

Jack Edmonston is group vice-president of communication services at CW Communications, publisher of Computerworld, *in Framingham, Mass.*

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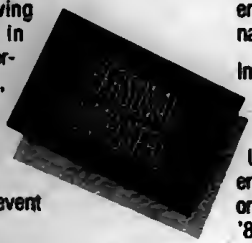

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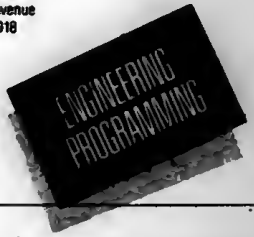

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THE USER EXPERIENCE

INFORMATION SERVICES

General Electric Information Services Company, U.S.A.

EXECUTIVE SUITE

This senior vice-president's story holds out hope for executives over 40 coming late to the microcomputer age.

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INFORMATION FOR ALL

Manufacturers Hanover's goal is to put information resources within the reach of 75% of professionals in three to five years.

Page 73

Raychem

MICRO NETS

Raychem, a Fortune 500 manufacturer, finds networking micros a cost-effective way to keep tabs on a business unit.

Page 78

EXECUTIVE SUITE

(Raymond W. Marshall is senior vice-president, Technology Operations, at General Electric Information Services Co. in Rockville, Md. His firm applies micros to operational analysis, decision support and business management.)

There is no doubt that micros have changed the fabric of doing business for many executives. A management consulting firm recently estimated that 17% of the nation's managers and 13% of the top executives now have access to microcomputers.

This rapid growth in the use of micros reflects the trend toward the integrated office where mainframes, minicomputers and micros will share the same information more efficiently. It will result in more productive people integrating electronically, allowing independent analysis of more data than ever before possible.

The micro has become a "window on the information world" for the busy executive. Rather than being a dumb-terminal user out at the end of a network connected to a host, the manager is now the center of his information universe.

Although many executives over 40 missed the evolution of computers and genuinely fear using one in their work, it is virtually mandatory for them to learn and become proficient in using a micro or they will be left behind.

Whether he likes it or not, the modern-day executive is being forced to more integral use of his micro — doing things differently than in the past, not just automating current operations.

At General Electric Information Services Co., more than 1,500 micros are in use by executives, managers and individual contributors. Because the company operates the world's largest voice and data telecommunications network, the use of micros by our managers and executives is probably slightly different from the experiences of other companies.

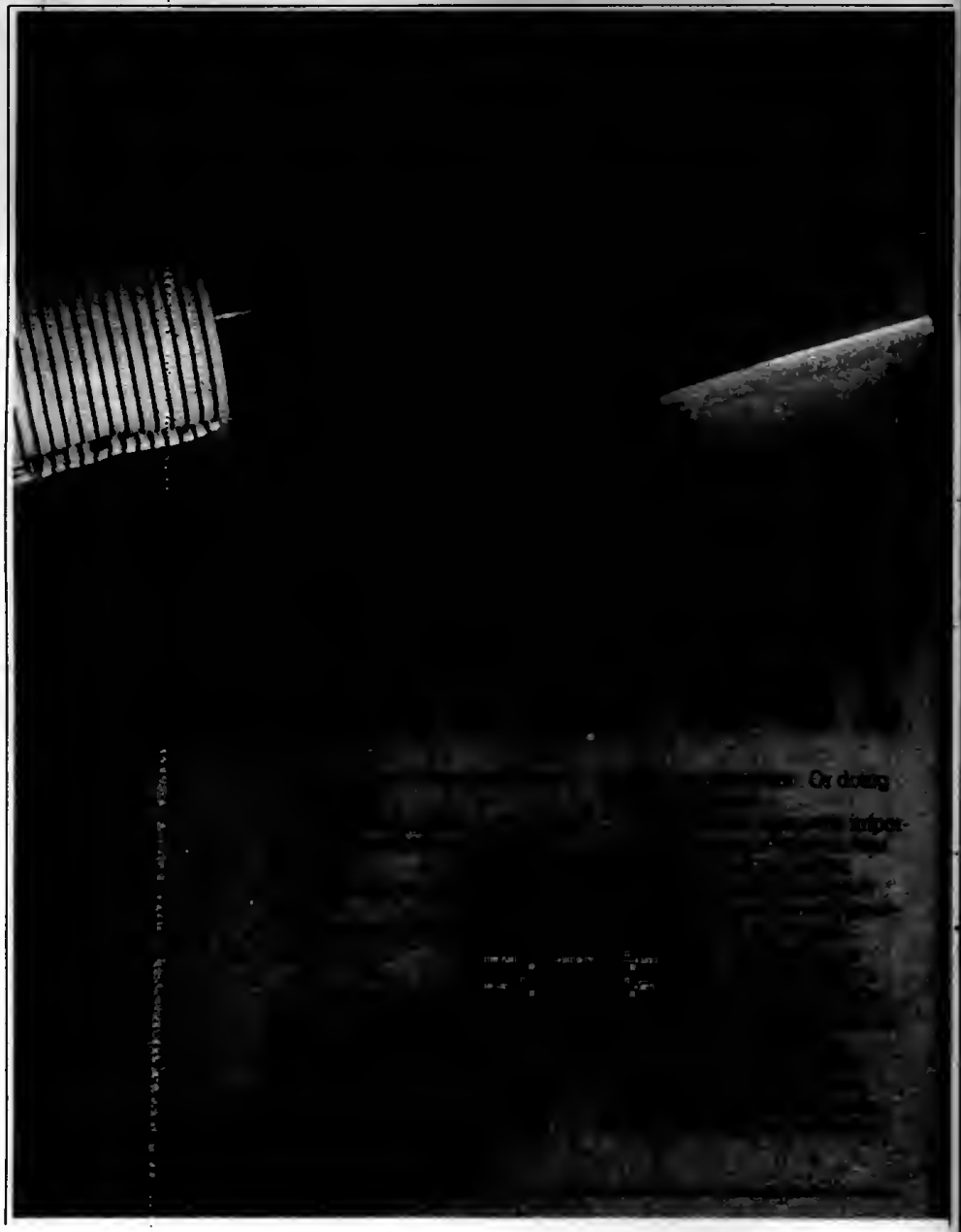
Basically, our micros are used in three main areas: operational analysis, decision support and business management.

In terms of operational analysis, micros allow us to keep constant tabs as we plan and manage our communications networks. Data can be collected and verified, either on-line or off-line, by using a micro and then transmitted to our network for further processing, if needed.

For example, our micros are used in telecommunications planning and operations analysis of Dial Comm — General Electric Co.'s long-distance telecommunications network, which is the largest private industrial telephone system in the U.S. Micros enable us to track new orders for Dial Comm service throughout the company, review service contracts and monitor the system's quality control. Similarly, micros are used in the data network to provide both planning and real-time network monitoring.

In the decision support area, I use my micro in reviewing various company worksheets and spreadsheets, for financial analysis and to ask what-if questions that no one had the time to answer before.

Raymond Marshall uses a micro to review company worksheets and spreadsheets.



I use the micro at least three different ways in the area of business management. First, I use it extensively as a communications device in the office and when traveling on company business.

Through our electronic mailbox system, Quik-Comm, which is accessed by my micro, I am able to keep in communication with my office in Rockville, Md., and with many other GE components throughout the world while traveling. When I return home from a trip, or in the evening and on weekends, I use the micro to pick up and send messages to my secretary and my colleagues.

I can also use the micro to access centralized data bases that may be of value to me in doing my job more efficiently.

A third business management use is in critical project analysis through our Mark III teleprocessing network. I am able to review project schedules, do inquiry/status checks and to review quality assurance reports and other engineering reports.

In addition, I see micros used extensively in financial analysis of the company's operations and business opportunities.

Market forecasts

According to the Yankee Group, this year the number of micros in use in the office will double to 5.4 million units. A market research group also contends that by 1987, nearly 80% of the U.S. labor force will interact with the computer on the job.

Two major factors will cause the use of micros in the corporate world to expand: One is the increased exposure of corporate executives and middle managers to new hardware and software as a result of massive advertising campaigns and increased news coverage. The other is the incorporation of micros into the nation's educational system — from elementary school through college.

Frequently the business manager views micros only as stand-alone devices. In essence, he has a short-range view of their potential. The business manager who uses micros strictly for word processing, electronic spreadsheets and charts and graphs is only beginning to use the micro to its full capability. The intersection of the microcomputer, a large-scale communications network and a large mainframe will provide a magnum increase in the value of micro use in the second half of this decade. This arrangement will allow for the balancing and pulling together of all available data within a company.

INFORMATION FOR ALL

(Donald E. Smith is president of Manufacturers Hanover Financial Management Systems, Inc. in New York. He says that while technically oriented managers and professionals were the first to show interest in personal computers at his company, the balance is now beginning to shift to business managers.)

Manufacturers Hanover Trust recognized in 1981 that personal computers were significantly different from the front-office technologies it had been using. It was relatively easy to predict the impact of the earlier tools on the organization and to avoid disruption. Personal computers, with their richness of applications and potential for connectivity, are more complex and, therefore, more capable of disruption.

Corporate officials acknowledged, however, that personal computers could solve many of the integration problems with which the business had been struggling. In one cost-effective package, they can perform many functions that are typically performed in less integrated fashion. Most important, personal computers also can give users direct control to customize solutions to their particular business problems.

Manufacturers Hanover's General Administrative Board issued a "Personal Computer Acquisition Policy" in June 1982. The policy requires that all requests for personal computers be approved by user senior management and be acknowledged by the office automation group. In response, office automation has formed a separate personal computer unit to focus on the task.

In-house computer stores play several roles. They are learning centers in which demonstrations and tutorials are conducted to teach the basics of the most commonly used software. Manuals are available and prospective users are encouraged to learn more about a package of interest by actually running it themselves. In short, the stores ensure that MHT does not wind up with an expensive inventory of unused, unsupported, misunderstood systems hidden in closets.

The first group to call for personal computers was data processing professionals. Since Manufacturers Hanover made extensive use of IBM mainframes in its data center, IBM

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By concentrating on IBM and Wang, the office automation department feels it is capable of providing the support needed by its users.

Today, Manufacturers Hanover has about 450 personal computers installed.

was a logical choice for this user set.

The traditional office automation customer was next to seek personal computing. In this arena, the front office, user friendliness is a key consideration, and a large base of Wang VS and OIS systems had already been installed. Compatibility in these environments was ensured by the choice of the Wang Professional Computer.

Manufacturers Hanover does not expect to be a one-vendor shop, but the office automation department believes it is important to limit the number of vendors. By concentrating on IBM and Wang, the department feels it is capable of providing the support needed by its users.

While the company feels this approach is desirable now, as experience increases and costs become more predictable, the policy will undoubtedly change.

That is the perspective from the company's internal point of view. But now consider the automation plan for an entire generic business, and you will see that an important element in that plan is the central or host processing computer and its offspring, the data base of corporate records.

In a very simplified way, every act performed within the business relates to those records in one way or another. These acts can be broken into three large classes.

First is the activity designed to ensure the accuracy and currency of the data base. Data capture and work flow are the primary focus here, and interconnection to the host computer generally is the overriding factor in product selection, although there are unexploited independent niches of opportunity in any organization within this activity.

The second activity uses the data base without amplification or enlargement to inform or instruct others, both internal and external, as to status or required action.

Reporting is the primary focus here, and the facilities used are largely those of the central site for billing or status reporting, augmented by word processing and electronic mail — that is, basic office automation services. There are not many independent niches here; the heavy volumes and high visibility of these activities have traditionally received close attention from the DP organization.

The last activity analyzes the changing contents of the data base to understand the health of the organization and redirect efforts to enhance or maintain it. The people involved in this activity are the knowledge workers and decision makers. The great personal computer market that is perceived to exist in business has its foundations here. This group contains the curiosity seekers, data manipulators and problem solvers; the personal computer seems to be the inspired solution to their particular needs.

Dynamic and diverse in their use of data and analysis tools, the group is served with difficulty by the central host. They are the what-if players, and the large, highly organized machines are generally inappropriate for their purposes. Independent niches of opportunity abound in this area, but there generally will be corporate bias toward viewing these as the province of the office automation group.

Today, Manufacturers Hanover has about 450 personal computers installed — a two-year average growth rate of about nine systems per month. The rate is increasing, and by year-end, the total is expected to be more than 500. While technically oriented managers and professionals were the first to show interest in personal computers, the balance is now beginning to shift to business managers. The last personal computer users group meeting was attended by more than 150 people, most of whom were business and not data processing professionals.

Manufacturers Hanover's strategic objective is to provide information resources within arm's reach of 75% of managers and professionals within three to five years.

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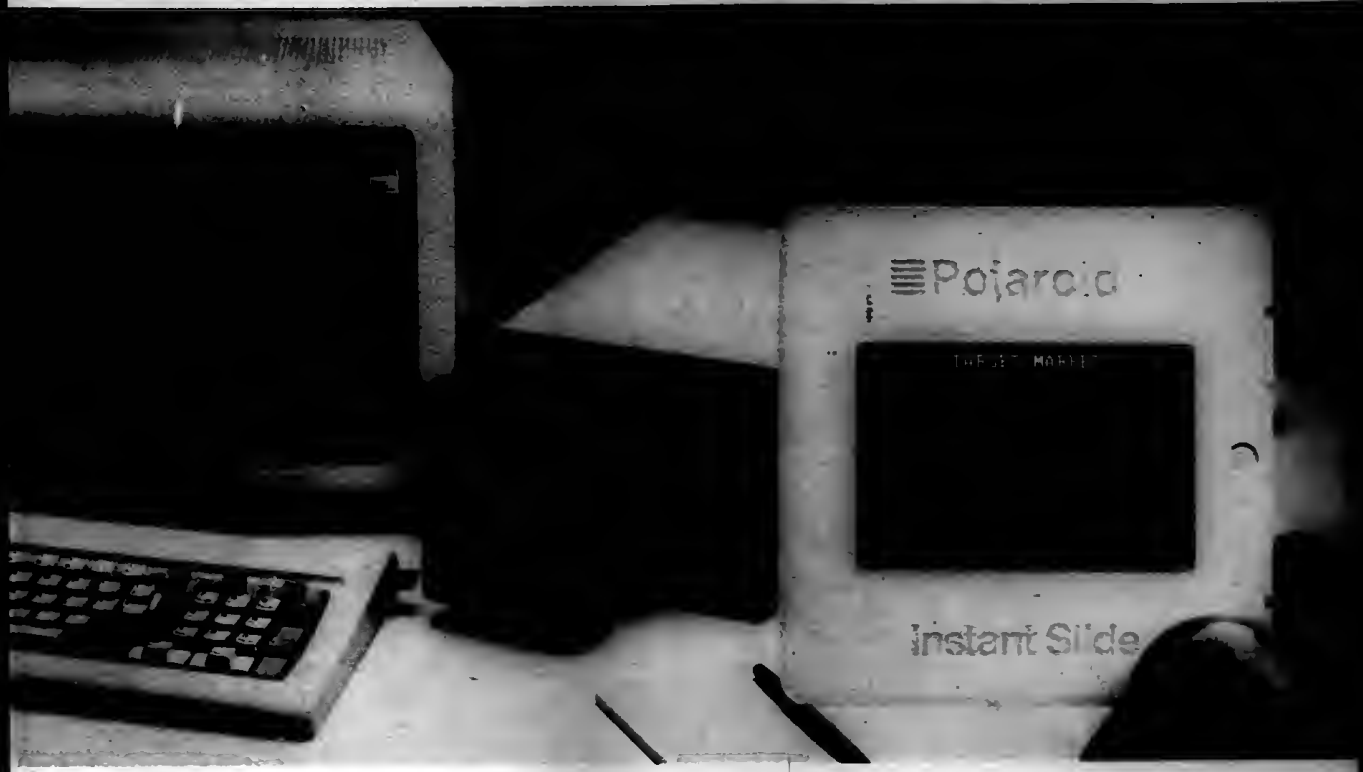

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Rethink the Link

MICRO NETS

(Marcia Brooks is associate editor of the "Office Automation Reporting Service," a monthly newsletter published by International Data Corp., an industry market research firm in Framingham, Mass. Here, Brooks describes how users at Raychem Corp. and other firms are setting up personal computer networks.)

When Thomas Peters and Robert Waterman published *In Search of Excellence* in 1982, the book soared to the top of best-seller lists. Recession was fresh in people's minds, and a renewed interest in enterprise under a strongly pro-business administration built a business advice-hungry audience. The book promised insights into what management was doing right at what were, in the authors' opinion, some of America's best managed companies.

In a special report available this fall, International Data Corp.'s (IDC) "Office Automation Reporting Service" went in search of "excellent" companies to find out what, if anything, they were doing to communicate with personal computers. If they did so many other things right in administering their businesses, their personal computer strategies might provide some guidance to others lurching along the personal computer communications trail.

The "excellent" companies seldom proposed networking solutions that could be described as innovative or out of the ordinary.

More than 30 large companies were contacted for the study, "Personal Computer Networks in Large Organizations," including several major office computer manufacturers. Employees at 18 companies (16 of them "excellent") were interviewed extensively about their personal computer communications plans.

Each company saw personal computers in terms of corporate strategy and culture. However microcomputers were deployed in a given company, they were to be used in a way consistent with the company's basic style of doing business. Personal computer networks, too, were designed with corporate culture in mind. If a company tended to be entrepreneurial, it developed flexible systems that responded to user demands, often with no particular concern for existing mainframe environments or entrenched office systems.

If, on the other hand, a company had strongly centralized management control, personal computer network access tended to be more formally structured and more strictly controlled.

The so-called excellent companies seldom proposed or implemented networking solutions that could be described as innovative or out of the ordinary. In most cases, in fact, they were doing the most unimaginative thing of all: terminal emulation to a mainframe or minicomputer via hard wire. A few, however, arrived at unconventional solutions to data sharing.

But discussions with those companies pointed out that the single most important objective in personal computer communications is to gain access to host computer data. Even in the few companies that had implemented or begun pilots with peer-to-peer personal computer networks, the ultimate goal was to create a comprehensive, large system network of which personal computers were an integral part.

The special report findings on the excellent companies are bolstered by recent data from a survey conducted by IDC of large corporations' personal computer sites, also discussed in "Personal Computer Networks." Forty-one percent of large companies surveyed that have personal computers reported that more than half their personal computers had access to mainframes.

Peer-to-peer links appear to be a lower priority now, both for the companies interviewed and for respondents to the personal computer user survey. Seventy-six percent of personal computer user companies indicated that less than 5% of their installed personal computers were linked via small networks. Of the companies interviewed, only five had local personal computer nets in place. In many cases, however, companies were very interested in using peer-to-peer networks in the future. They hoped to make more efficient use of peripherals and storage or to improve intradepartmental communications.

One of the companies held up by Peters and Waterman as one that allows its units and employees a measure of autonomy is Raychem Corp., a Fortune 500 manufacturer of electronic components based in Menlo Park, Calif. Autonomy is exactly the thing Robert Hummer, formerly MIS manager at one of Raychem's divisions, said characterized the company: "We're an autonomous division. Corporate pretty much trusts each division to get the job done."

The personal computer network that evolved was not what Hummer had in mind when he went to a nearby computer store, Computers Plus in Sunnyvale, early this year. He started out just looking for a solution to his data storage problem and went in search of a hard disk. "But as soon as I looked at mass storage, it seemed obvious that it would be a good idea to network the machines," he said.

Why did it seem like such a good idea? "Well, the quality control department is downstairs at the back of the building. People upstairs do reports. With the network in place, they can have accurate data right there," Hummer explained.

Using microcomputers in a network is, Hummer thinks, a cost-effective way to keep tabs on a small company or business unit. "Mainframes give you complex reports, and managers won't read them. With micros, you can take data that previously wasn't even kept on mainframes and produce simple reports. It gives us a clearer picture of our situation, so we aren't wasting resources."

Of the companies interviewed, only five had local personal computer nets in place. However, many of the companies were interested in using peer-to-peer networks in the future.

Hummer started off with just three Apple Computer, Inc. Apple IIes in place, for which he chose Corvus Systems, Inc.'s Omninet with a 6M-byte hard disk. The net consists of a hard disk for file storage, a disk server that acts as an intelligent interface between the disk and workstations and an interface card in each personal computer. Data is carried over twisted-pair wires installed in certain walls within the building. The workstations are shared by users in several function areas. Hummer would have liked to wire the entire building, but he was in no hurry as long as AT&T and IBM apparently had set no clear course.

"The Corvus performed flawlessly with the Apples," he said. Satisfied with the network, he then decided to add two IBM Personal Computers, making a true multivendor network.

For the time being, Hummer will remain a loyal Corvus customer. He is enthusiastic about the network software Omninet provides, a critical factor, to his mind, in the operation of a personal computer network. But he is aware that Omninet has its limitations, too. "If you're going to use many more than about 10 files, you probably can't use a system like Corvus," he said.

The experiences of Raychem and others are detailed in "Personal Computer Networks in Large Organizations," which may be ordered from IDC Publications, 5 Speen St., Framingham, Mass. 01701.

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